

Ray's for Today Scope & Sequence:
Level 7 – Intermediate Math – Ages 12 and 13

Number Concepts

- nature of Math
- number system
- closure in the number system
- nature of arithmetic operations
- place value system
- properties of operations
- language of math, numeration & symbols
- word form, standard form, expanded form, expanded group form
- translating from English to the language of math with each type of number
- order of operations with each type of number
- sets and set notation
- math reasoning & story problems with each type of number

Whole Numbers

- addition & subtraction – as foundational operations, inverse operations, identifying terms
- properties of addition
- multiplication & division – relationship to addition/subtraction, inverse operations
- properties of multiplication
- divisibility
- rounding off & estimating
- using a calculator
- special characteristics of numbers – factors, multiples, odd/even, prime/composite
- prime factorizing and number trees

Integers

- definition & concepts
- what gained with this expansion of the number system
- closure & signed numbers
- components of signed numbers
- properties of signed numbers
- plotting signed numbers using vectors
- comparing & ordering signed numbers
- absolute value
- additive inverse
- arithmetic operations with integers

Rational Numbers – Fractions

- definition
- properties & closure
- precision and betweenness
- fraction concepts – naming, vocabulary, proper/improper, mixed numbers, fractional equivalents of 1/whole numbers; equivalent fractions
- comparing and ordering fractions
- operations on fractions & mixed numbers
- adding/subtracting like denominators
- adding/subtracting unlike denominators
- reducing fractions & finding the Greatest Common Divisor
- finding the Lowest Common Multiple
- using GCD and LCM
- multiplying/dividing fractions & mixed numbers
- reciprocals
- complex fractions

Rational Numbers – Decimals & Percents

- definition of decimal
- decimal place values – whole & fractional
- decimal concepts – naming, writing, converting to fractional form
- betweenness with decimals
- ordering & comparing decimals
- terminating/non-terminating and repeating decimals
- introduction to types of real numbers
- arithmetic operations with decimals
- definition of percent & why can't operate on percents directly
- converting rational numbers in three forms: fraction/decimal/percent
- converting percents to solve problems
- percents greater than 100%
- percent increase/decrease, amount of change
- using rational numbers with the $A = B \times C$ formula
- monetary transactions – discounts, percentage off, finding the best deal, consecutive percents off, profit/loss, cost/list/mark-up
- sales tax – finding the rate, calculating the tax and total payment
- tips and commissions
- simple/compound interest
- using simple interest formula

Signed Rational Numbers

- definition of signed fractions & decimals
- plotting signed fractions & decimals using vectors

- ordering & comparing signed fractions & decimals
- arithmetic operations with signed fractions & decimals

Time & Measurement

- methods of converting measurements within a system (customary & metric)
- converting between two types of temperature systems (Fahrenheit and Celsius/Centigrade)
- global time zones
- types of maps and globes (why distortions)
- imaginary map lines and locating positions
- working with latitude and longitude

Geometry Concepts

- definition of geometry
- planes, points, lines, rays
- angles – type, reflex, angle relationships, measuring & copying angles, bisecting angles, adjacent angles
- parallel and intersecting lines
- transversals and related angles
- polygons defined and identified, regular & irregular
- triangles – definition, types, drawing, measuring, interior/exterior angles
- convex and concave
- finding perimeter & area of triangles
- quadrilaterals definition, vocabulary, types, specialness, finding diagonals
- finding perimeter of a quadrilateral and composite figures
- defining base and height
- areas of polygons – squares/rectangle, parallelogram, trapezoid (isosceles/general)
- specialness of right triangles
- Pythagorean Theorem
- finding areas of different polygons
- circles – definition, vocabulary, finding circumference and area, measuring central angles
- tangents
- coordinate plane – four quadrants, two-dimensional, ordered pair of two numbers, plotting points, signs of coordinates in four quadrants
- solid figures in three-dimensions – vocabulary, naming/identifying solid figures, coordinates have 3 numbers
- volume of cubes & rectangular prisms
- surface area and nets for cubes, rectangular prisms, triangular prism
- volume of triangular prisms and triangular pyramid
- volume, surface area, net for cylinders
- “undoing” solid figures (figural perception)

Exponential Numbers

- definition and component parts (base, exponent), type of rational number
- why exponents and usefulness
- relationship of exponents to multiplication
- writing & converting exponents (word form, exponential form, factored form, standard form)
- exponents and different bases
- arithmetic operations with exponents
- positive and negative exponents
- negative exponent vs. negative integer
- negative exponent and fractional place values
- a number to the zero power & number raised to first power
- exponents in formulas and equations, order of operation and translation
- scientific notation & powers of 10
- using scientific notation, converting to and from standard form and scientific notation
- roots as inverse of powers
- roots – definition, symbols, naming
- perfect square
- simplifying roots
- arithmetic operations and roots

Ratios & Proportions

- ratios defined – describing a relationship
- methods for writing ratios
- distributions and totals with ratios
- ratios that compare more than two items
- using ratios to solve problems
- proportion defined – vocabulary, component parts, means/extremes
- properties of a proportion
- using proportions to solve problems – rates, rates of pay, unit pricing, increasing/decreasing recipes, map distance/actual distance, enlargements/reductions, numerical test score to percent

Graphing

- ways to organize and visualize data
- line plots, stem-and-leaf plots, scatter plots, box-whiskers
- quartiles and bell curve

Probability

- definition of probability, vocabulary
- fairness, odds
- fundamental counting principle

- numerical measure between 0 and 1
- probability expressed as a percent
- using probabilities
- probability of an event
- probability based on previous outcomes vs. educated guesses

Problem-Solving

- review basic problem-solving strategies
- review basic types of story problems
- review formula components
- solving formula – only when 1 variable unknown
- number sentences and equations
- distance problems
- time interval problems
- direct and inverse relationships, constants
- more involved work problems
- number puzzles
- using drawings to picture the story and reason through the problem
- translating words and drawings into math sentences and equations
- usefulness of algebra
- vocabulary and symbols of basic algebra – variables, coefficients, terms, like terms, equalities and inequalities, formulas as special equations
- general equations
- simplifying expressions
- two-step equations
- using equations to show relationships between two variables
- functions
- slope and plotting functions & equations in $y = mx + b$ form
- plotting direct and inverse relationships