Galway Math Curriculum Guide
4th Grade

Problem Solving Strand

Students will build new mathematical knowledge through problem solving.

- 4.PS.1 Explore, examine, and make observations about a social problem or mathematical situation
- 4.PS.2 Understand that some ways of representing a problem are more helpful than others
- 4.PS.3 Interpret information correctly, identify the problem, and generatebpossible solutions

Students will solve problems that arise in mathematics and in other contexts.

- 4.PS.4 Act out or model with manipulatives activities involving mathematical content from literature
- 4.PS.5 Formulate problems and solutions from everyday situations
- 4.PS.6 Translate from a picture/diagram to a numeric expression
- 4.PS.7 Represent problem situations in oral, written, concrete, pictorial, and graphical forms
- 4.PS.8 Select an appropriate representation of a problem

Students will apply and adapt a variety of appropriate strategies to solve problems.

- 4.PS.9 Use trial and error to solve problems
- 4.PS.10 Use process of elimination to solve problems
- 4.PS.11 Make pictures/diagrams of problems
- 4.PS.12 Use physical objects to model problems
- 4.PS.13 Work in collaboration with others to solve problems
- 4.PS.14 Make organized lists to solve numerical problems
- 4.PS.15 Make charts to solve numerical problems
- 4.PS.16 Analyze problems by identifying relationships
- 4.PS.17 Analyze problems by identifying relevant versus irrelevant information
- 4.PS.18 Analyze problems by observing patterns
- 4.PS.19 State a problem in their own words

Students will monitor and reflect on the process of mathematical problem solving.

- 4.PS.20 Determine what information is needed to solve a problem
- 4.PS.21 Discuss with peers to understand a problem situation
- 4.PS.22 Discuss the efficiency of different representations of a problem
- 4.PS.23 Verify results of a problem
- 4.PS.24 Recognize invalid approaches
- 4.PS.25 Determine whether a solution is reasonable in the context of the original problem

Reasoning and Proof Strand

Students will recognize reasoning and proof as fundamental aspects of mathematics.

- 4.RP.1 Use representations to support mathematical ideas
- 4.RP.2 Determine whether a mathematical statement is true or false and explain why

Students will make and investigate mathematical conjectures.

- 4.RP.3 Investigate the use of knowledgeable guessing by generalizing mathematical ideas
- 4.RP.4 Make conjectures from a variety of representations

Students will develop and evaluate mathematical arguments and proofs.

- 4.RP.5 Justify general claims or conjectures, using manipulatives, models, and expressions
- 4.RP.6 Develop and explain an argument using oral, written, concrete, pictorial, and/or graphical forms
- 4.RP.7 Discuss, listen, and make comments that support or reject claims made by other students

Students will select and use various types of reasoning and methods of proof.

- 4.RP.8 Support an argument by trying many cases
- 4.RP.9 Disprove an argument by finding counterexamples

Communication Strand

Students will organize and consolidate their mathematical thinking through communication.

- 4.CM.1 Understand and explain how to organize their thought process
- 4.CM.2 Verbally explain their rationale for strategy selection
- 4.CM.3 Provide reasoning both in written and verbal form

Students will communicate their mathematical thinking coherently and clearly to peers, teachers, and others.

- 4.CM.4 Organize and accurately label work

- 4.CM.5 Share organized mathematical ideas through the manipulation of objects, drawing, pictures, charts, graphs, tables, diagrams, models, symbols, and expressions in written and verbal form
- 4.CM.6 Answer clarifying questions from others

Students will analyze and evaluate the mathematical thinking and strategies of others.

- 4.CM.7 Restate mathematical solutions shared by other students
- 4.CM.8 Consider strategies used and solutions found in relation to their own work

Students will use the language of mathematics to express mathematical ideas precisely.

- 4.CM.9 Increase their use of mathematical vocabulary and language when communicating with others
- 4.CM.10 Describe objects, relationships, solutions, and rationale using appropriate vocabulary
- 4.CM.11 Decode and comprehend mathematical visuals and symbols to construct meaning

Connections Strand

Students will recognize and use connections among mathematical ideas.

- 4.CN.1 Recognize, understand, and make connections in their everyday experiences to mathematical ideas
- 4.CN.2 Compare and contrast mathematical ideas
- 4.CN.3 Connect and apply mathematical information to solve problems

Students will understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

- 4.CN.4 Understand multiple representations and how they are related
- 4.CN.5 Model situations with objects and representations and be able to make observations

Students will recognize and apply mathematics in contexts outside of mathematics.

- 4.CN.6 Recognize the presence of mathematics in their daily lives
- 4.CN.7 Apply mathematics to solve problems that develop outside of mathematics
- 4.CN.8 Recognize and apply mathematics to other disciplines

Representation Strand

Students will create and use representations to organize, record, and communicate mathematical ideas.

- 4.R.1 Use verbal and written language, physical models, drawing charts, graphs, tables, symbols, and equations as representations
- 4.R.2 Share mental images of mathematical ideas and understandings
- 4.R.3 Recognize and use external mathematical representations
- 4.R.4 Use standard and nonstandard representations with accuracy and detail

Students will select, apply, and translate among mathematical representations to solve problems.

- 4.R.5 Understand similarities and differences in representations
- 4.R.6 Connect mathematical representations with problem solving
- 4.R.7 Construct effective representations to solve problems

Students will use representations to model and interpret physical, social, and mathematical phenomena.

- 4.R.8 Use mathematics to show and understand physical phenomena (e.g., estimate and represent the number of apples in a tree)
- 4.R.9 Use mathematics to show and understand social phenomena (e.g., determine the number of buses required for a field trip)
- 4.R.10 Use mathematics to show and understand mathematical phenomena (e.g., use a multiplication grid to solve odd and even number problems)

Number Sense and Operations Strand

Students will understand numbers, multiple ways of representing numbers, relationships among numbers, and number systems.

- 4.N.1 Skip count by 1,000's
- 4.N.2 Read and write whole numbers to 10,000
- 4.N.3 Compare and order numbers to 10,000
- 4.N.4 Understand the place value structure of the base ten number system: 10 ones = 1 ten
  10 tens = 1 hundred / 10 hundreds = 1 thousand / 10 thousands = 1 ten thousand
- 4.N.5 Recognize equivalent representations for numbers up to four digits and generate them by decomposing and composing numbers
- 4.N.6 Understand, use, and explain the associative property of multiplication
- 4.N.7 Develop an understanding of fractions as locations on number lines and as divisions of whole numbers

- 4.N.8 Recognize and generate equivalent fractions (halves, fourths, thirds, fifths, sixths, and tenths) using manipulatives, visual models, and illustrations
- 4.N.9 Use concrete materials and visual models to compare and order unit fractions or fractions with the same denominator (with and without the use of a number line)
- 4.N.10 Develop an understanding of decimals as part of a whole
- 4.N.11 Read and write decimals to hundredths, using money as a context
- 4.N.12 Use concrete materials and visual models to compare and order decimals (less than 1) to the hundredths place in the context of money
- 4.N.13 Develop an understanding of the properties of odd/even numbers as a result of multiplication

Students will understand meanings of operations and procedures, and how they relate to one another.

- 4.N.14 Use a variety of strategies to add and subtract numbers up to 10,000
- 4.N.15 Select appropriate computational and operational methods to solve problems
- 4.N.16 Understand various meanings of multiplication and division
- 4.N.17 Use multiplication and division as inverse operations to solve problems
- 4.N.18 Use a variety of strategies to multiply two-digit numbers by one-digit numbers (with and without regrouping)
- 4.N.19 Use a variety of strategies to multiply two-digit numbers by two-digit numbers (with and without regrouping)
- 4.N.20 Develop fluency in multiplying and dividing multiples of 10 and 100 up to 1,000
- 4.N.21 Use a variety of strategies to divide two-digit dividends by one-digit divisors (with and without remainders)
- 4.N.22 Interpret the meaning of remainders
- 4.N.23 Add and subtract proper fractions with common denominators
- 4.N.24 Express decimals as an equivalent form of fractions to tenths and hundredths
- 4.N.25 Add and subtract decimals to tenths and hundredths using a hundreds chart

Students will compute accurately and make reasonable estimates.

- 4.N.26 Round numbers less than 1,000 to the nearest tens and hundreds
- 4.N.27 Check reasonableness of an answer by using estimation

Algebra Strand

Students will represent and analyze algebraically a wide variety of problem solving situations.

- 4.A.1 Evaluate and express relationships using open sentences with one operation

Students will perform algebraic procedures accurately.

- 4.A.2 Use the symbols <, >, =, and ≠ (with and without the use of a number line) to compare whole numbers and unit fractions and decimals (up to hundredths)
- 4.A.3 Find the value or values that will make an open sentence true, if it contains < or >

Students will recognize, use, and represent algebraically patterns, relations, and functions.

- 4.A.4 Describe, extend, and make generalizations about numeric ($+,-,\times,\div$) and geometric patterns
- 4.A.5 Analyze a pattern or a whole-number function and state the rule, given a table or an input/output box

Geometry Strand

Students will use visualization and spatial reasoning to analyze characteristics and properties of geometric shapes.

- 4.G.1 Identify and name polygons, recognizing that their names are related to the number of sides and angles (triangle, quadrilateral, pentagon, hexagon, and octagon)
- 4.G.2 Identify points and line segments when drawing a plane figure
- 4.G.3 Find perimeter of polygons by adding sides
- 4.G.4 Find the area of a rectangle by counting the number of squares needed to cover the rectangle
- 4.G.5 Define and identify vertices, faces, and edges of three-dimensional shapes

Students will identify and justify geometric relationships, formally and informally.

- 4.G.6 Draw and identify intersecting, perpendicular, and parallel lines *Relationships*
- 4.G.7 Identify points and rays when drawing angles
- 4.G.8 Classify angles as acute, obtuse, right, and straight

Measurement Strand

Students will determine what can be measured and how, using appropriate methods and formulas.

- 4.M.1 Select tools and units (customary and metric) appropriate for the length being measured

- 4.M.2 Use a ruler to measure to the nearest standard unit (whole, ½ and ¼ inches, whole feet, whole yards, whole centimeters, and whole meters)
- 4.M.3 Know and understand equivalent standard units of length: 12 inches = 1 foot / 3 feet = 1 yard
- 4.M.4 Select tools and units appropriate to the mass of the object being measured (grams and kilograms)
- 4.M.5 Measure mass, using grams
- 4.M.6 Select tools and units appropriate to the capacity being measured (milliliters and liters)
- 4.M.7 Measure capacity, using milliliters and liters

Students will use units to give meaning to measurements.

- 4.M.8 Make change, using combined coins and dollar amounts
- 4.M.9 Calculate elapsed time in hours and half hours, not crossing A.M./P.M.
- 4.M.10 Calculate elapsed time in days and weeks, using a calendar

Statistics and Probability Strand

Students will collect, organize, display, and analyze data.

- 4.S.1 Design investigations to address a question from given data
- 4.S.2 Collect data using observations, surveys, and experiments and record appropriately
- 4.S.3 Represent data using tables, bar graphs, and pictographs
- 4.S.4 Read and interpret line graphs

Students will make predictions that are based upon data analysis.

- 4.S.5 Develop and make predictions that are based on data
- 4.S.6 Formulate conclusions and make predictions from graphs