Galway Math Curriculum Guide
6th Grade

Problem Solving Strand

Students will build new mathematical knowledge through problem solving.

- 6.PS.1 Know the difference between relevant and irrelevant information when solving problems
- 6.PS.2 Understand that some ways of representing a problem are more efficient than others
- 6.PS.3 Interpret information correctly, identify the problem, and generate possible strategies and solutions

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

- 6.PS.4 Act out or model with manipulatives activities involving mathematical content from literature
- 6.PS.5 Formulate problems and solutions from everyday situations
- 6.PS.6 Translate from a picture/diagram to a numeric expression
- 6.PS.7 Represent problem situations verbally, numerically, algebraically, and/or graphically
- 6.PS.8 Select an appropriate representation of a problem
- 6.PS.9 Understand the basic language of logic in mathematical situations (and, or, and not)

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

- 6.PS.10 Work in collaboration with others to solve problems
- 6.PS.11 Translate from a picture/diagram to a number or symbolic expression
- 6.PS.12 Use trial and error and the process of elimination to solve problems
- 6.PS.13 Model problems with pictures/diagrams or physical objects
- 6.PS.14 Analyze problems by observing patterns
- 6.PS.15 Make organized lists or charts to solve numerical problems

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

- 6.PS.16 Discuss with peers to understand a problem situation
- 6.PS.17 Determine what information is needed to solve problem
- 6.PS.18 Determine the efficiency of different representations of a problem
- 6.PS.19 Differentiate between valid and invalid approaches
- 6.PS.20 Understand valid counterexamples
- 6.PS.21 Explain the methods and reasoning behind the problem solving strategies used
- 6.PS.22 Discuss whether a solution is reasonable in the context of the original problem
- 6.PS.23 Verify results of a problem

Reasoning and Proof Strand

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

- 6.RP.1 Recognize that mathematical ideas can be supported using a variety of strategies
- 6.RP.2 Understand that mathematical statements can be supported, using models, facts, and relationships to explain their thinking

Students will make and investigate mathematical conjectures.

- 6.RP.3 Investigate conjectures, using arguments and appropriate mathematical terms
- 6.RP.4 Make and evaluate conjectures, using a variety of strategies

Students will develop and evaluate mathematical arguments and proofs.

- 6.RP.5 Justify general claims or conjectures, using manipulatives, models, expressions, and mathematical relationships
- 6.RP.6 Develop and explain an argument verbally, numerically, algebraically, and/or graphically
- 6.RP.7 Verify claims other students make, using examples and counterexamples when appropriate

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

- 6.RP.8 Support an argument through examples/counterexamples and special cases
- 6.RP.9 Devise ways to verify results

Communication Strand

Students will organize and consolidate their mathematical thinking through communication.

- 6.CM.1 Provide an organized thought process that is correct, complete, coherent, and clear
- 6.CM.2 Explain a rationale for strategy selection
- 6.CM.3 Organize and accurately label work

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

- 6.CM.4 Share organized mathematical ideas through the manipulation of objects, numerical tables, drawings, pictures, charts, graphs, tables, diagrams, models, and symbols in written and verbal form

- 6.CM.5 Answer clarifying questions from others

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

- 6.CM.6 Understand mathematical solutions shared by other students
- 6.CM.7 Raise questions that elicit, extend, or challenge others' thinking
- 6.CM.8 Consider strategies used and solutions found by others in relation to their own work

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

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

Connections Strand

Students will recognize and use connections among mathematical ideas.

- 6.CN.1 Understand and make connections and conjectures in their everyday experiences to mathematical ideas
- 6.CN.2 Explore and explain the relationship between mathematical ideas
- 6.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.

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

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

- 6.CN.6 Recognize and provide examples of the presence of mathematics in their daily lives
- 6.CN.7 Apply mathematics to problem situations that develop outside of mathematics
- 6.CN.8 Investigate the presence of mathematics in careers and areas of interest
- 6.CN.9 Recognize and apply mathematics to other disciplines and areas of interest

Representation Strand

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

- 6.R.1 Use physical objects, drawings, charts, tables, graphs, symbols, equations, or objects created using technology as representations
- 6.R.2 Explain, describe, and defend mathematical ideas using representations
- 6.R.3 Read, interpret, and extend external models
- 6.R.4 Use standard and nonstandard representations with accuracy and detail

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

- 6.R.5 Use representations to explore problem situations
- 6.R.6 Investigate relationships between different representations and their impact on a given problem

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

- 6.R.7 Use mathematics to show and understand physical phenomena (e.g., determine the perimeter of a bulletin board)
- 6.R.8 Use mathematics to show and understand social phenomena (e.g., construct tables to organize data showing book sales)
- 6.R.9 Use mathematics to show and understand mathematical phenomena (e.g., Find the missing value: $(3 + 4) + 5 = 3 + (4 + \_\_\_)$

Number Sense and Operations Strand

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

- 6.N.1 Read and write whole numbers to trillions
- 6.N.2 Define and identify the commutative and associative properties of addition and multiplication
- 6.N.3 Define and identify the distributive property of multiplication over addition
- 6.N.4 Define and identify the identity and inverse properties of addition and multiplication
- 6.N.5 Define and identify the zero property of multiplication
- 6.N.6 Understand the concept of rate
- 6.N.7 Express equivalent ratios as a proportion
- 6.N.8 Distinguish the difference between rate and ratio
- 6.N.9 Solve proportions using equivalent fractions

- 6.N.10 Verify the proportionality using the product of the means equals the product of the extremes
- 6.N.11 Read, write, and identify percents of a whole (0% to 100%)
- 6.N.12 Solve percent problems involving percent, rate, and base
- 6.N.13 Define absolute value and determine the absolute value of rational numbers (including positive and negative)
- 6.N.14 Locate rational numbers on a number line (including positive and negative)
- 6.N.15 Order rational numbers (including positive and negative)

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

- 6.N.16 Add and subtract fractions with unlike denominators
- 6.N.17 Multiply and divide fractions with unlike denominators
- 6.N.18 Add, subtract, multiply, and divide mixed numbers with unlike denominators
- 6.N.19 Identify the multiplicative inverse (reciprocal) of a number
- 6.N.20 Represent fractions as terminating or repeating decimals
- 6.N.21 Find multiple representations of rational numbers (fractions, decimals, and percents 0 to 100)
- 6.N.22 Evaluate numerical expressions using order of operations (may include exponents of two and three)
- 6.N.23 Represent repeated multiplication in exponential form
- 6.N.24 Represent exponential form as repeated multiplication
- 6.N.25 Evaluate expressions having exponents where the power is an exponent of one, two, or three

Students will compute accurately and make reasonable estimates.

- 6.N.26 Estimate a percent of quantity (0% to 100%)
- 6.N.27 Justify the reasonableness of answers using estimation (including rounding)

Algebra Strand

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

- 6.A.1 Translate two-step verbal expressions into algebraic expressions

Students will perform algebraic procedures accurately.

- 6.A.2 Use substitution to evaluate algebraic expressions (may include exponents of one, two and three)
- 6.A.3 Translate two-step verbal sentences into algebraic equations
- 6.A.4 Solve and explain two-step equations involving whole numbers using inverse operations
- 6.A.5 Solve simple proportions within context
- 6.A.6 Evaluate formulas for given input values (circumference, area, volume, distance, temperature, interest, etc.)

Geometry Strand

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

- 6.G.1 Calculate the length of corresponding sides of similar triangles, using proportional reasoning
- 6.G.2 Determine the area of triangles and quadrilaterals (squares, rectangles, rhombi, and trapezoids) and develop formulas
- 6.G.3 Use a variety of strategies to find the area of regular and irregular polygons
- 6.G.4 Determine the volume of rectangular prisms by counting cubes and develop the formula
- 6.G.5 Identify radius, diameter, chords and central angles of a circle
- 6.G.6 Understand the relationship between the diameter and radius of a circle
- 6.G.7 Determine the area and circumference of a circle, using the appropriate formula
- 6.G.8 Calculate the area of a sector of a circle, given the measure of a central angle and the radius of the circle
- 6.G.9 Understand the relationship between the circumference and the diameter of a circle

Students will apply coordinate geometry to analyze problem solving situations.

- 6.G.10 Identify and plot points in all four quadrants
- 6.G.11 Calculate the area of basic polygons drawn on a coordinate plane (rectangles and shapes composed of rectangles having sides with integer lengths)

Measurement Strand

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

- 6.M.1 Measure capacity and calculate volume of a rectangular prism
- 6.M.2 Identify customary units of capacity (cups, pints, quarts, and gallons)
- 6.M.3 Identify equivalent customary units of capacity (cups to pints, pints to quarts, and quarts to gallons)

- 6.M.4 Identify metric units of capacity (liter and milliliter)
- 6.M.5 Identify equivalent metric units of capacity (milliliter to liter and liter to milliliter)
- 6.M.6 Determine the tool and technique to measure with an appropriate level of precision: capacity

Students will develop strategies for estimating measurements.

- 6.M.7 Estimate volume, area, and circumference (see figures identified in geometry strand)
- 6.M.8 Justify the reasonableness of estimates
- 6.M.9 Determine personal references for capacity

Statistics and Probability Strand

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

- 6.S.1 Develop the concept of sampling when collecting data from a population and decide the best method to collect data for a particular question
- 6.S.2 Record data in a frequency table
- 6.S.3 Construct Venn diagrams to sort data
- 6.S.4 Determine and justify the most appropriate graph to display a given set of data (pictograph, bar graph, line graph, histogram, or circle graph)
- 6.S.5 Determine the mean, mode and median for a given set of data
- 6.S.6 Determine the range for a given set of data
- 6.S.7 Read and interpret graphs

Students will make predictions that are based upon data analysis.

- 6.S.8 Justify predictions made from data

Students will understand and apply concepts of probability.

- 6.S.9 List possible outcomes for compound events
- 6.S.10 Determine the probability of dependent events
- 6.S.11 Determine the number of possible outcomes for a compound event by using the fundamental counting principle and use this to determine the probabilities of events when the outcomes have equal probability