

Subject Philosophy for Mathematics

Mathematics is included in the curriculum of St. John's Lutheran School because mathematics demonstrates the order in God's creation and is a universal understanding. Without the development of mathematical abilities students would not be fully prepared for lives of responsible Christian service to His church and the community. The study of mathematics facilitates the students' ability to recognize the created order God has given them and apply understanding and logical problem solving skills needed for successful participation in the modern world.

Exit goals

Mathematics: Students will, from a Christ-centered Perspective:

- A. Know and understand numbers, how they relate to each other, and be fluent in using math computations correctly and accurately.**
- B. Analyze and find the unknown using patterns, relationships, functions, symbols, and graphs to predict outcomes.**
- C. Observe and analyze two and three-dimensional shapes, demonstrate spatial reasoning, and apply the appropriate techniques, tools, and/or formulas to determine measurement.**
- D. Select and apply a variety of appropriate strategies and/or reasoning to solve mathematical problems.**
- E. Create and use manipulatives and/or visual aids to organize, record, and demonstrate methods used to solve problems and interpret data.**
- F. Explain mathematical processes clearly and precisely to peers, teachers, and others.**

Grade Level Measurable Objectives

Kindergarten

Students in Kindergarten will by the end of Kindergarten show, demonstrate, and understand:

A.1 Understand the relationship between numbers and quantities and how to represent them in written language.

A.2 Count to 100 by ones and by tens.

A.3 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group.

B.1 Identify, extend, and create patterns of sounds, physical movements, shapes, or concrete objects and translate from one representation to another.

B.2 Use patterns to predict what comes next, including cause and effect relationships.

B.3 Read a calendar using days, weeks, and months.

C.1 Identify shapes as two-dimensional (flat) or three-dimensional (solid) and compare and analyze different shapes using informal language to describe their similarities and differences.

C.2 Estimate and measure length, capacity, and weight of objects using nonstandard units.

C.3 Compare and order two or three concrete objects according to length, capacity, or weight.

D.1 Describe and identify objects in order to sort them according to a given attribute using formal language.

D.2 Identify coins and how much they are worth.

D.3 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds, acting out situations, verbal explanations, expressions, or equations.

D.4 Identify an object's position using ordinal numbers and place an object in a specific position.

E.1 Classify objects into given categories; count the number of objects in each category and sort the categories by count.

E.2 Construct and analyze a graph using real objects or pictures in order to answer questions.

E.3 Describe one object in relation to another using informal language such as over, under, above, and below.

F.1 Use language such as before or after to describe relative position in a sequence of events or objects.

F.2 Describe and identify an object by its attributes using informal language.

Grade 1

Students will at 85% proficiency by the end of Grade One be able to:

- A.1 Name fractional parts of a geometric shape.
 - A.2 Understand and solve addition and subtraction problems.
 - A.3 Complete 100 adding facts in 5 minutes.
 - B.1 Create graphs to interpret data and information on a calendar.
 - B.2 Recognize skip counting by fives, tens, and even and odd numbers patterns.
 - B.3 Count by ones over 100.
 - C.1 Identify time to the hour and half hour.
 - C.2 Measure objects using standard and non-standard units of measure.
 - C.3 Identify geometric shapes and tell the number of sides and angles on the shape.
 - C.4 Use attributes to show how shapes are alike or different.
 - D.1 Sort, classify, and order objects by size, shape, length, number, and other properties.
 - D.2 Understand and apply addition and subtraction to story problems and life experiences.
 - D.3 Identify and count coins by fives and tens.
 - E.1 Understand place value by using concrete objects to describe them to others.
 - E.2 Create sets using concrete objects to describe, compare, and order whole numbers.
- Students will be able to show ability to:
- F.1 Use SMART board and other technology to explain mathematical logic, problems, and solutions to others.
 - F.2 Use reasoning abilities to defend work.

Grade 2

Students will at 85% proficiency by the end of Grade Two be able to:

- A.1 Complete 25 subtracting facts in 3 minutes.
- A.2 Add two digit numbers with and without regrouping.
- A.3 Write fractions and draw figures to represent fractions.
- B.1 Find missing numbers or symbols in patterns.
- B.2 Read graphs and create their own graphs representations.
- B.3 Estimate and round numbers to the nearest tens.
- C.1 Tell time to the 5 minute.

C.2 Use ruler to measure line and draw their own lines to the nearest $\frac{1}{2}$ inch and nearest centimeter.

C.3 Tell the nearest temperature on a 2 degree scale.

D.1 Count and use quarters, nickels, dimes, and pennies.

D.2 Use monetary coins to find money amounts.

D.3 Draw pictures and find math problems in stories.

D.4 Use ordinals through 12.

E.1 Create and interpret pie graphs.

E.2 Create and interpret pictographs.

E.3 Create and interpret bar graphs.

Students will be able to show the ability to:

F.1 Orally identify halves, thirds, and fourths.

F.2 Describe time on a clock using hours and minutes.

F.3 Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.

Grade 3

Students will at 85% proficiency by the end of Grade Three be able to:

A.1 Name fraction parts of a set or parts of a whole.

A.2 Determine the number of things in a set by combining and arranging (ex. All possible coin combinations).

A.3 Represent and explain whole numbers with place-value concepts and notation through the thousands place.

A.4 Represent and explain fractions with place-value concepts and notations.

A.5 Determine the number of things in a set by estimation, including rounding.

B.1 Recognize and use generalized properties and relationships of arithmetic (commutative property of addition, inverse relationship of multiplication, and division).

B.2 Use reasoning ability to perceive patterns.

B.3 Read, extract, and interpret data presented in graphs, tables, or charts.

C.1 Describe two- and three- dimensional figures by identifying their properties and naming them.

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C.2 Identify and use relationships among figures, including but not limited to position.

C.3 Determine measurements by using basic relationships (ex. Perimeter/area using metric/U.S. customary).

D.1 Use mathematics as a way to understand other areas of the curriculum (ex. Measurement in Science, map skills in Social Studies).

D.2 Use mathematics in problem solving situations.

D.3 Monitor and reflect on the process of mathematical problem solving.

E. 1 In problem solving situations read, extract, and use information presented in graphs, tables, or charts.

E.2 Communicate mathematical ideas in a variety of ways including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models.

Students will show the ability to:

F.1 Analyze and evaluate the mathematical thinking and strategies of others.

F.2 Organize and consolidate their mathematical thinking through written communication.

Intermediate 4

Students will at 85% proficiency by the end of Intermediate 4 be able to:

A.1 Write and verbalize whole numbers, decimals, and fractions.

A.2 Read, write, and order whole numbers, simple fractions, and commonly used decimals.

A.3 Represent and explain whole numbers with place value concepts and notation through the millions place.

A.4 Solve and formulate fact families for addition and subtraction.

A.5 Read and interpret measuring instruments including rulers, clocks, and thermometers.

B.1 Know how to use symbols including $<$, $>$, $+$, $-$, \times , \div , and $=$ correctly.

B.2 Generate a number pattern that follows a given rule.

B.3 Use a variety of subtraction and addition patterns to solve for the unknown.

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- C.1 Identify and draw lines, angles, and shapes.
 - C.2 Identify and use relationships among figures including position and intersection (ex. Parallel, perpendicular).
 - C.3 Demonstrate and understand basic facts, principals, and techniques of measurement (metric and U.S. customary)
 - D.1 Use mathematics as a way to understand other areas of the curriculum (measurement in Science, map skills in Social Studies).
 - D.2 Use mathematics in problem solving situations involving money.
 - D.3 Apply area and perimeter calculations to real world problems.
 - E.1 Use manipulatives and graph paper to demonstrate perimeter and area.
 - E.2 Create and use representations to organize, record, and communicate mathematical ideas (ex. Poster explaining a mathematics concept).
- Students will show the ability to:
- F.1 Communicate mathematical ideas through words, numbers, and symbols.
 - F.2 Analyze and evaluate the mathematical thinking and strategies of others.

Intermediate 5

Students will at 85% proficiency by the end of Intermediate 5 be able to:

- A.1 Represent and explain whole numbers, decimals, and fractions with number lines.
- A.2 Recognize and use generalized properties of addition and multiplication.
- A.3 Identify and represent equivalent fractions.
- A.4 Add, subtract, multiply, and divide fractions with like denominators.
- A.5 Identify prime factors of a whole number and common factors of a set of whole numbers.
- B.1 Solve simple equations and inequalities.
- B.2 Use letters, boxes, or other symbols to stand for any number, measured quantity, or object in simple situations (ex. Variables).
- B.3 Identify prime and composite numbers.

C.1 Identify and describe two and three dimensional figures by comparing, classifying, and naming them.

C.2 Use physical materials and motions geometry (slides, flips, turns) to identify properties and relationships of symmetry, congruence, or similarity.

C.3 Show the results of translations, rotations, and reflections.

D.1 Determine if future events are more, less, or equally likely, impossible, or certain to occur.

D.2 In problem solving situations involving money, add and subtract decimals.

D.3 Predict outcomes of future events and test predictions using data from a variety of activities.

E.1 Use tables and graphs to show data in various types of data graphs (line, stem/leaf/line plot).

E.2 Organize and display data from statistical investigations using appropriate plots (ex. Line, stem/leaf, box, scatter plot).

Students will show the ability to:

F.1 Communicate mathematical ideas in a variety of ways including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models.

F.2 Develop effective oral and written presentations that include mathematical language.

F.3 Use the language of mathematics to express mathematical ideas precisely.

Course 1, Course 2, Course 3

Students will at 85% proficiency by the completion of Course 1, Course 2, and Course 3 be able to:

A.1 Explain equivalencies among and convert between fractions, decimals, and percent's.

A.2 Compare, represent, and interpret rational and irrational numbers with verbal descriptions, geometric models, and mathematical notation.

A.3 Perform and explain operations on rational and irrational numbers such as adding, subtracting, multiplying, dividing, and exponents.

A.4 Recognize and use the generalized properties of rational and irrational numbers.

A.5 Solve multistep problems using all operations including square roots, cube roots, positive and negative exponents, rate, percentage change, and scientific notation.

B.1 Apply proportional thinking in a variety of problem situations by creating and using ratios, unit ratios, and proportions.

B.2 Work with algebraic expressions in mathematical operations.

B.3 Solve and graph linear and nonlinear expressions.

B.4 Determine the slope and equation of a line on a coordinate plane.

B.5 Combine algebraic like terms.

B.6 Work with linear and nonlinear patterns and relationships in a variety of ways including representing them with tables, graphs, algebraic expressions, equations, and inequalities.

C.1 Identify and use relationships among the component parts of special and complex two- and three- dimensional figures (eg. Parallel sides, congruent faces).

C.2 Identify and contrast properties of two- and three- dimension figures (e.g. symmetrical, isosceles, regular).

C.3 Locate objects using the rectangular coordinate system.

C.4 Use formulas to calculate area, surface area, volume, and perimeter of polygons and circles.

C.5 Identify, describe, and plot transformations including translations, rotations, and dilations on a coordinate plane.

C.6 Construct and accurately measure geometric figures using a compass, protractor, and /or ruler.

C.7 Use geometric models to represent and explain numerical and algebraic relationships.

D.1 In problem solving situations, select and use appropriate computational procedures such as estimating, mental math, creating equations, and proportions.

D.2 Analyze non-routine problems by modeling, illustrating, guessing, simplifying, generalizing, shifting to another point of view, etc...

D.3 Apply the use of order of operations involving whole numbers, fractions, decimals, and roots and exponents.

D.4 Determine probability and percent chance.

D.5 Use algebraic expressions to solve problems by generating, substituting, and evaluating.

D.6 Recognize, describe, and analyze functional relationships by generalizing a rule that characterizes the pattern of change among variables to solve a problem.

E.1 Organize and display data from statistical investigations using appropriate tables, graphs, and/or charts.

E.2 Create bar graphs, histograms, circle graphs, line plots, box and whisker plots, and stem and leaf plots from a set of data.

E.3 Use visual tools to represent and solve problems.

Students will show the ability to:

F.1 Explain mathematical properties and how they are applied.

F.2 Explain the relationships between 2D and 3D shapes and their parts.

F.3 Explain the difference between the types of graphs and which one is best for a set of data.

F.4 Explain the difference between theoretical, experimental, and compound probability.

F.5 Analyze and evaluate the mathematical thinking and strategies of others.