STANDARDS ALIGNMENT GUIDE

Alaska State Standards
Mathematics Grade 4

INTRODUCTION

Minecraft: Education Edition is an open-world game that promotes creativity, collaboration, and problem-solving in an immersive environment where the only limit is your imagination. As a game-based learning platform, Minecraft offers educators a transformative way to engage students and ignite their passion for learning. Teacher from around the world are using Minecraft in their classroom to successfully:

- Increase Student Engagement,
- Facilitate Classroom Collaboration
- Provide opportunities for Creative Exploration
- Connect Learning to Tangible Outcomes

This alignment guide will provide you with links to activities you can use in your classroom. These activities take full advantage of Minecraft's capabilities to complement and enhance classroom teaching. In this guide, you will find a list of applicable standards along with links and descriptions of Minecraft activities that focus on each objective.

For more information on using Minecraft in your classroom or to find additional education resources and training materials, visit us online.

education.minecraft.net

OPERATIONS AND ALGEBRAIC THINKING

STANDARD	DESCRIPTION	ACTIVITY
Use the four operations with whole numbers to solve problems.		
4.OA.1	Interpret a multiplication equation as a comparison e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 groups of 7 and 7 groups of 5 (Commutative property). Represent verbal statements of multiplicative comparisons as multiplication equations.	Math Bed Wars! Students build arrays to show commutative properties of multiplication while constructing defenses as part of a Minecraft mini-game.
4.OA.2	Multiply or divide to solve word problems involving multiplicative comparison (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem or missing numbers in an array). Distinguish multiplicative comparison from additive comparison.	Build a Word Problem Students write word problems then build a representation of their problem in Minecraft, including characters to help tell the story and models to prove their math.
4.OA.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	Build a Two-Step Word Problem Design and solve a two-step word problem by building it as scene in Minecraft.
Gain familiarity with factors and multiples.		
4.OA.4	Find all factor pairs for a whole number in the range 1–100. Explain the correlation/differences between multiples and factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.	Finding Factors Students will use a 100 chart on paper as a map to build rectangles that show the factors for each number between 1 and 100.
Generate and analyze patterns.		
4.OA.5	Generate a number, shape pattern, table, t-chart, or input/output function that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. Be able to express the pattern in algebraic terms.	American Flag Three-Act Math Welcome to the world of Three-Act Mathematics in Minecraft! Ask Questions, Work Collaboratively, and Build Understanding. Patterns and Motifs Students will understand patterns in history to identify information about how people lived, their beliefs, their surroundings and culture. Number Pattern Architecture Students explore math models to learn about arithmetic patterns and create towers in architectural designs.
4.OA.6	Extend patterns that use addition, subtraction, multiplication, division or symbols, up to 10	American Flag Three-Act Math

	terms, represented by models (function machines), tables, sequences, or in problem situations.	Welcome to the world of Three-Act Mathematics in Minecraft! Ask Questions, Work Collaboratively, and Build Understanding. Patterns and Motifs Students will understand patterns in history to identify information about how people lived, their beliefs, their surroundings and culture. Number Pattern Architecture Students explore math models to learn about arithmetic patterns and create towers in architectural designs. Number Patterns Algebra Architecture Students complete and document problems in Minecraft to find growth patterns and missing numbers then use a number pattern to build an architectural structure.

NUMBERS & OPERATIONS IN BASE TEN

STANDARD	DESCRIPTION	ACTIVITY
Generalize place value understanding for multi-digit whole numbers.		
4.NBT.1	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	Minecraft Math Gladiators (MMG) Wither Battle Regrouping Students take part in a gameshow mini game. Inside they will regroup numbers in Minecraft and work together to fight the Wither Boss.
4.NBT.2	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on the value of the digits in each place, using >, =, and < symbols to record the results of comparisons.	Minecraft Math Gladiators (MMG): Base Ten Puzzles Students take part in a game show mini game. Inside they will learn to solve problems using base-ten numerals.
4.NBT.3	Use place value understanding to round multi-digit whole numbers to any place using a variety of estimation methods; be able to describe, compare, and contrast solutions.	Minecraft Math Gladiators: Elytra Flight and Rounding Solve Base 10 rounding math problems and play Minecraft Minigames.
Use place value understanding and properties of operations to perform multi-digit arithmetic.		
4.NBT.4	Fluently add and subtract multidigit whole numbers using any algorithm. Verify the reasonableness of the results.	Angler Arithmetic – Cool math! Gamify Math Class or use Game-Based Learning and Project-Based Learning with a healthy dose of competition to engage students of all ages with FISHING. Minecraft Math Gladiators (MMG): Regrouping Obstacle Course Inside Minecraft Math Gladiators students will watch videos that will help them find strategies for regrouping. Minecraft Math Gladiators (MMG): Wither Battle Regrouping Students take part in a gameshow mini game. Inside they will regroup numbers in Minecraft and work together to fight the Wither Boss. Subtraction + Regrouping CTF

		Students will view and build math models of base 10 subtraction problems.
4.NBT.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Multi Digit Multiplication in Minecraft Bed Wars Students will solve and build area models of multi digit multiplication problems and use this knowledge to play a mini game.
4.NBT.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Long Division in Minecraft Students will build long division math models in Minecraft and solve division problems on paper using the algorithm.

NUMBERS & OPERATIONS - FRACTIONS

STANDARD	DESCRIPTION	ACTIVITY
Extend understanding of fraction equivalence and ordering.		
4.NF.1	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
4.NF.2	Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2). Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions (e.g., by using a visual fraction model).	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.		
4.NF.3	Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.	
	a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	Fraction Farm Explore math models of addition and subtraction problems with fractions then create a plan for a farm in Minecraft using what you've learned. Javelin Line Plots-3 Students engage in a javelin throwing competition in Minecraft, plotting the distances and scores on line plot graphs in the game. Fractions in Minecraft

		Students will build math models that correspond to fraction operations and solve four to six problems per standard.
	b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions (e.g., by using a visual fraction model).	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
	c. Add and subtract mixed numbers with like denominators (e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction).	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
	d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators (e.g., by using visual fraction models and equations to represent the problem).	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
4.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.	
	a. Understand a fraction a/b as a multiple of 1/b.	American Flag Three-Act Math Welcome to the world of Three-Act Mathematics in Minecraft! Ask Questions, Work Collaboratively, and Build Understanding. Decimal/Fraction Garden Students will demonstrate understanding a fractional and decimal relationships using a 10 x 10 garden. Fraction Stories Have students discover fractions in real life settings and have them communicate their findings through fraction stories. Fraction World Based on a lesson plan submitted by another user, wold download available. Capture the Flag! Students will be able to build and explain Minecraft math models that show the relationship between equivalent fractions. Then add design purpose to their models by using them strategically in a mini-game. Crafting Fractions Students will observe crafting recipes, write them as fractions, and then use that knowledge to make an escape! Fraction Pixel Art Using a pixel art editor (or graph paper) students design an artwork, then break down the colors into fractions, discuss number patterns and unit fractions, then build their designs in Minecraft. Fractions Steeplechase Students will build and explain Minecraft math models that show fractions, improper fractions, and mixed

		numbers on number lines, then use number lines to create jumps for a horse race. Fractions and Multiplication Video Observe and build math models that show patterns when multiplying numbers greater than, less than, or equal to 1. Create a video to show knowledge. Measuring Landforms Students will choose and name their own length of measurement. Then they will get into a world and measure different kinds land features. Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
	b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number.	Fraction Capture the Flag Solve fraction problems, peer review math models based on solutions and use the models to play a mini-game. Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
	c. Solve word problems involving multiplication of a fraction by a whole number (e.g., by using visual fraction models and equations to represent the problem). Check for the reasonableness of the answer.	Fraction Capture the Flag Solve fraction problems, peer review math models based on solutions and use the models to play a mini-game. Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
Understand decimal notation for fractions, and compare decimal fractions.		
4.NF.5	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
4.NF.6	Use decimal notation for fractions with denominators 10 or 100.	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.
4.NF.7	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions (e.g., by using a visual model).	Fractions in Minecraft Students will build math models that correspond to fraction operations and solve four to six problems per standard.

MEASUREMENT & DATA

STANDARD	DESCRIPTION	ACTIVITY

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit, and involving time.		
4.MD.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.	Measurement Mini Game Students will play, examine, and create plans for a mini game that is 120 meters long. Also they will make tables that will show how many meters, centimeters, and kilometers each level of the game is, then they will test each others games.
4.MD.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	Measurement Mini Game Students will play, examine, and create plans for a mini game that is 120 meters long. Also they will make tables that will show how many meters, centimeters, and kilometers each level of the game is, then they will test each others games.
4.MD.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	Survival City Making Homes Unit, Part 1 Survival City Making Homes Unit, Part 2 Survival City Making Homes Unit, Part 3 Design a prototype of a home and use area and perimeter to find out how many materials they will need to build it in survival.
4.MD.4	Solve real-world problems involving elapsed time between U.S. time zones (including Alaska Standard time).	N/A
Represent and interpret data.		
4.MD.5	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.	Javelin Line Plots In this world students will learn about line plots by throwing tridents and tracking their distance on a line plot graph.
4.MD.6	Explain the classification of data from real-world problems shown in graphical representations including the use of terms range and mode with a given set of data.	N/A
Geometric measurement: understand concepts of angle and measure angles.		
4.MD.7	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand the following concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.	Lines, Angles, and Architecture Students will explore parallel lines, perpendicular lines, acute angles, and obtuse angles and use this knowledge to design facades for buildings.

	b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	
4.MD.8	Measure and draw angles in whole-number degrees using a protractor. Estimate and sketch angles of specified measure.	Measuring Angles and Building Bridges Students will enter the world in pairs and work together to measure and build angles, add and subtract angles, and finally design a bridge built at an angle that a boat can sail under.
4.MD.9	Recognize angle measure as additive. When an angle is divided into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems (e.g., by using an equation with a symbol for the unknown angle measure).	Measuring Angles and Building Bridges Students will enter the world in pairs and work together to measure and build angles, add and subtract angles, and finally design a bridge built at an angle that a boat can sail under.

GEOMETRY

STANDARD	DESCRIPTION	ACTIVITY
Draw and identify lines and angles, and classify shapes by properties of their lines and angles.		
4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular, parallel, and intersecting line segments. Identify these in two-dimensional (plane) figures.	Points, Lines, Rays, Segments, and Droppers Students will learn about 2 dimensional geometric figures by creating dropper games in Minecraft.
4.G.2	Classify two-dimensional (plane) figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	Lines, Angles, and Architecture Students will explore parallel lines, perpendicular lines, acute angles, and obtuse angles and use this knowledge to design facades for buildings.
4.G.3	Recognize a line of symmetry for a two-dimensional (plane) figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	Symmetry in Pixel Art In Minecraft, students find lines of symmetry within pixel art, solve partially complete models, and finally design their own symmetrical pixel art with a partner.