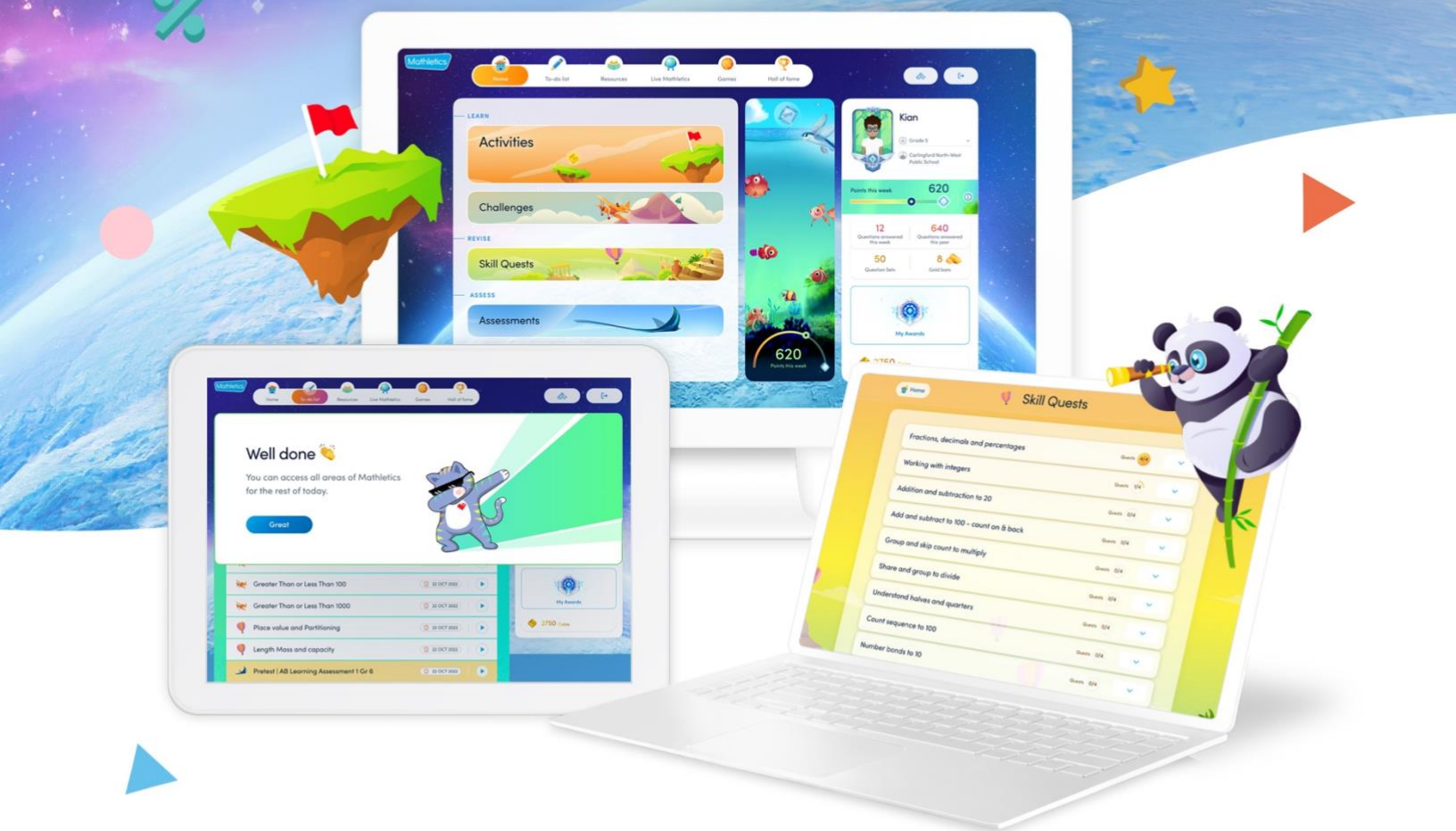
Mathletics

Indiana Academic Standards

Activities (Courses) and Skill Quests



Grades 7-8

August, 2025

Mathletics

Mathletics

Indiana Mathematics Standards

Activities (Courses)

August 2025

Grade 7

1. Number Sense

Students connect earlier learning to express the prime factorization of whole numbers using exponents, understand the inverse relationship between perfect squares and square roots, and use number lines to compare and order rational and irrational numbers.

7.NS.1 Show on a number line that a number and its opposite have a sum of 0 (are additive inverses). Find and interpret sums of rational numbers in real-world contexts.	
Course Topics	**Activities**
NS - Integers	Adding Integers: Positive, Negative or Zero

7.NS.2 Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	
Course Topics	**Activities**
Teacher directed	

7.NS.3 Use the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers.	
Course Topics	**Activities**
NS - Integers	Multiplying and Dividing Integers
	Integers: Multiply and divide 1

7.NS.4 Explain that if p and q are integers, then –(p/q) = (–p)/q = p/(–q) for all nonzero integers.	
Course Topics	**Activities**
NS - Integers	Multiplying and Dividing Integers
	Integers: Multiply and divide 1

7.NS.5 Find the prime factorization of whole numbers and write the results using exponents.	
Course Topics	**Activities**
NS - Prime factorization and square roots	Prime or Composite Numbers
	Prime Factoring
	Prime factorisation with Indices

7.NS.6 Apply the inverse relationship between squaring and finding the square root of a perfect square whole number. Find square roots of perfect square whole numbers.	
Course Topics	**Activities**
NS - Prime factorization and square roots	Square Roots
	Square Roots 1

7.NS.7 Compute fluently with rational numbers using an algorithmic approach.	
Course Topics	**Activities**
NS - Operations with rational numbers	Order of Operations 2 (PEDMAS)
	Add Decimals: Different Signs
	Mixed Numerals
	Subtract Mixed Numbers: Renaming
	Subtract Negative Mixed Numbers
	Subtract Mixed Numbers: Signs Differ
	Multiply Mixed Numbers
	Multiply Two Fractions 2
	Divide Mixed Numbers with Signs
	Divide Fractions by Fractions 2
	More Fraction Problems

2. Ratios and Proportional Reasoning

Students continue to use ratio and rate language, compute using unit rates, and use proportional relationships to solve real-world problems involving ratios and percents.

7.RP.1 Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships.	
Course Topics	**Activities**
RP - Ratio & proportion	Rates
	Unitary Method
	Rate Word Problems
	Average Speed
	Distance Travelled
	Time Taken

7.RP.2 Use proportional relationships to solve ratio and percent problems with multiple operations (e.g., simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease).	
Course Topics	**Activities**
RP - Ratio & proportion	Dividing a Quantity in a Ratio
	Simple Interest
	Commission
	Percent Increase and Decrease
	Profit and Loss
	Percentage Error

7.RP.3 Represent real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent these proportional relationships. Apply the definition of unit rate to y = mx .	
Course Topics	**Activities**
	Direct Linear Variation
	Conversion Graphs

3. Algebra and Functions

Students use two variable equations, as well as graphs and tables, to model real-world proportional relationships and connect the constant of proportionality to the idea of slope.

7.AF.1 Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring out a common number (e.g., given 2x - 10 , create an equivalent expression 2(x - 5)). Justify each step in the process.	
Course Topics	**Activities**
AF - Expressions	Like Terms: Add, Subtract
	Algebraic Multiplication
	Dividing Expressions
	Using the Distributive Property
	Factoring
	Expand then Simplify

7.AF.2 Solve real-world problems with rational numbers by using one or two operations.	
Course Topics	**Activities**
Teacher directed	

7.AF.3 Solve equations of the form px + q = r and p(x + q) = r fluently, where p, q , and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.	
Course Topics	**Activities**
AF - Equations & inequalities	Solve Equations: Add, Subtract 2
	Solve Equations: Multiply, Divide 2
	Solve One-Step Equations
	Write an Equation: Word Problems

7.AF.4 Solve inequalities of the form px + q (> or ≥) r or px + q (< or ≤) r , where p, q , and r are specific rational numbers. Represent real-world problems using inequalities of these forms and solve such problems. Graph the solution set of the inequality and interpret it in the context of the problem.	
Course Topics	**Activities**
AF - Equations & inequalities	Solve One-Step Inequalities 1
	Solve One-Step Inequalities 2

	Inequalities on a Number Line: Mixed Basics
	Graphing Inequalities on Number Line

7.AF.5 Define slope as vertical change for each unit of horizontal change, and apply that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change.	
Course Topics	**Activities**
AF - Coordinate plane	Find the Function Rule

7.AF.6 Graph a line given its slope and a point on the line. Find the slope of a line given its graph.	
Course Topics	**Activities**
AF - Coordinate plane	Slope of a Line

4. Geometry and Measurement

Students use scale drawings, the area and circumference of circles, and the volume of cylinders and other three-dimensional solids to solve real-world problems.

7.GM.1 Solve real-world and other mathematical problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing. Create a scale drawing by using proportional reasoning.	
Course Topics	**Activities**
GM - Area & volume	Scale Measurement
	Scale Factor
	Floor Plans
	Perimeter, Area, Dimension Change

7.GM.2 Understand the formulas for area and circumference of a circle and use them to solve real-world and other mathematical problems; give an informal derivation of the relationship between circumference and area of a circle.	
Course Topics	**Activities**
GM - Area & volume	Calculate Circumference of Circles
	Area: Circles 2

7.GM.3 Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.	
Course Topics	**Activities**
GM - Area & volume	Volume: Prisms
	Volume: Cylinders

5. Data Analysis, Statistics, and Probability

Students make inferences about populations through sampling and learn about the importance of representative samples.

7.DSP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population. Understand that conclusions and generalizations about a population from a sample are valid only if the sample is representative of that population and that random sampling tends to produce representative samples and support valid inferences.	
Course Topics	**Activities**
DSP - Data Analysis	Methods of Data Sampling

7.DSP.2 Find, use, and interpret measures of central tendency (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.	
Course Topics	**Activities**
DSP - Data Analysis	Mean difference and deviation

7.DSP.3 Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.	
Course Topics	**Activities**
DSP - Data Analysis	Box-and-Whisker Plots 2

7.DSP.4 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Understand that a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Understand that a probability of 1 indicates an event certain to occur and a probability of 0 indicates an event impossible to occur. Identify probabilities of events as impossible, unlikely, equally likely, likely, or certain.	
Course Topics	**Activities**
DSP - Probablity	Probability Scale
	Chance Dial

7.DSP.5 Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to observed frequencies, evaluate the level of agreement, and explain possible sources of discrepancy.	
Course Topics	**Activities**
DSP - Probablity	Fair Games
	Introductory probability
	Find the Probability
	Complementary Events

Grade 8

1. Number Sense

Students continue to deepen their understanding of rational and irrational numbers by explaining the differences between them and solving real-world problems.

8.NS.1 Give examples of rational and irrational numbers, and explain the difference between them. State decimal equivalents for any number. For rational numbers, show that the decimal equivalent terminates or repeats, and convert a repeating decimal into a rational number.	
Course Topics	**Activities**
NS - Rational & irrational numbers	Fraction to Terminating Decimal
	Recurring Decimals
	Irrational Numbers

8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, plot them approximately on a number line, and estimate the value of expressions involving irrational numbers.	
Course Topics	**Activities**
NS - Rational & irrational numbers	Estimating Square Roots
	Irrational Numbers

8.NS.3 Given a numeric expression with common rational number bases and integer exponents, apply the properties of exponents to generate equivalent expressions.	
Course Topics	**Activities**
NS - Exponents	Exponents
	Exponent Notation
	Properties of Exponents
	Simplifying with Exponent Laws 1
	Integer Exponents

8.NS.4 Solve real-world problems with rational numbers by using multiple operations.	
Course Topics	**Activities**
NS - Rational & irrational numbers	More Fraction Problems
	Successive Discounts
	Integers: Order of Operations (BIDMAS)
	Integers: Order of Operations (PEDMAS)

2. Algebra and Functions

Students understand the formal definition of a function, analyze linear functions in multiple representations, and differentiate between linear and nonlinear functions. Students also solve a system of linear equations in two unknowns.

8.AF.1 Solve linear equations and inequalities with rational number coefficients fluently, including those whose solutions require expanding expressions using the distributive property and collecting like terms. Represent real-world problems using linear equations and inequalities in one variable and solve such problems.	
Course Topics	**Activities**
AF - Linear equations & inequalities	Equations with Fractions
	Solving More Equations
	Equations: Variables, Both Sides
	Solve Multi-Step Equations
	Equations to Solve Problems
	Solve One-Step Inequalities 2
	Solve Two-Step Inequalities
	Graphing Inequalities on Number Line
	Solving Inequalities 2

8.AF.2 Generate linear equations in one variable with one solution, infinitely many solutions, or no solutions. Justify the classification given.	
Course Topics	**Activities**
Teacher directed	

8.AF.3 Understand that a function assigns to each x-value (independent variable) exactly one y-value (dependent variable), and that the graph of a function is the set of ordered pairs (x,y) .	
Course Topics	**Activities**
AF - Functions & graphs	Function Rules and Tables
	Vertical Line Test
	Non Linear Graphs

8.AF.4 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described.	
Course Topics	**Activities**
Teacher directed	

8.AF.5 Interpret the equation y = mx + b as defining a linear function whose graph is a straight line; give examples of functions that are not linear. Describe similarities and differences between linear and nonlinear functions from tables, graphs, verbal descriptions, and equations.	
Course Topics	**Activities**
AF - Functions & graphs	Slope of a Line
	Equation of a Line 1
	Which Straight Line?
	Identifying Graphs
	What Type of Function?

8.AF.6 Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Within the context of a problem, describe the meaning of m (rate of change) and b (y-intercept) in y = mx + b .	
Course Topics	**Activities**
AF - Functions & graphs	Gradients for Real
	Modelling Linear Relationships

8.AF.7 Compare properties of two linear functions given in different forms, such as a table of values, equation, verbal description, and graph (e.g., compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed).	
Course Topics	**Activities**
Teacher directed	

8.AF.8 Approximate the solution of a system of equations by graphing and interpreting the reasonableness of the approximation.	
Course Topics	**Activities**
AF - Simultaneous equations	Solve Systems by Graphing
	Breakeven Point
	Simultaneous Linear Equations

3. Geometry and Measurement

Students explore transformations in the coordinate plane and are also expected to understand and explain the Pythagorean Theorem, its converse, and to use this relationship to solve problems and find distance on the coordinate plane.

8.GM.1 Explore dilations, translations, rotations, and reflections on two-dimensional figures in the coordinate plane.	
Course Topics	**Activities**
GM - Transformations	Transformations: Coordinate Plane
	Rotations: Coordinate Plane

8.GM.2 Solve real-world and other mathematical problems involving volume of cones, spheres, and pyramids and surface area of spheres.	
Course Topics	**Activities**
GM - Volume & surface area	Volume: Pyramids
	Volume: Cones
	Volume: Spheres
	Surface Area: Spheres

8.GM.3 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions.	
Course Topics	**Activities**
GM - Pythagoras' Theorem	Hypotenuse of a Right Triangle
	Pythagoras: Find a Short Side (integers only)
	Pythagoras: Find a Short Side (decimal values)
	Distance Between Two Points

4. Data Analysis, Statistics, and Probability

Students begin to investigate and represent bivariate data using scatter plots.They build on their experience with univariate data. Students also build on the probability work in grade seven to examine and represent the probability and compound events.

8.DSP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	
Course Topics	**Activities**
DSP - Data analysis & Probability	Scatter Plots

8.DSP.2 Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data. Interpret the slope and y-intercept in context.	
Course Topics	**Activities**
Teacher directed	

8.DSP.3 Represent sample spaces and find probabilities of compound events (independent and dependent) using organized lists, tables, and tree diagrams.	
Course Topics	**Activities**
DSP - Data analysis & Probability	Dice and Coins

8.DSP.4 Define the probability of a compound event, just as with simple events, as the fraction of outcomes in the sample space for which the compound event occurs. Use appropriate terminology to describe independent, dependent, complementary, and mutually exclusive events.	
Course Topics	**Activities**
Teacher directed	

8.DSP.5 For events with a large number of outcomes, understand the use of the multiplication counting principle. Develop the multiplication counting principle, and apply it to situations with a large number of outcomes.	
Course Topics	**Activities**
DSP - Data analysis & Probability	Counting Principle
	Counting Techniques 1
	Counting Techniques 2

For more information about Mathletics,
contact our friendly team.

www.mathletics.com/contact