Tennessee Mathematics

Integrated Math II

Adopted 2023

Number and Quantity

The Real Number System

A. Extend the properties of exponents to rational exponents. M2.N.RN.A

1. Extend the properties of integer exponents to rational exponents. M2.N.RN.A.1

   a. Develop the meaning of rational exponents by applying the properties of integer exponents. M2.N.RN.A.1.A

   b. Explain why x^{1/n} can be written as the nth root of x. M2.N.RN.A.1.B

   c. Rewrite expressions involving radicals and rational exponents using the properties of exponents. M2.N.RN.A.1.C

Quantities

A. Reason quantitatively and use units to understand problems. M2.N.Q.A

1. Use units as a way to understand real-world problems. M2.N.Q.A.1

   a. Choose and interpret the scale and the origin in graphs and data displays. M2.N.Q.A.1.A

   b. Use appropriate quantities in formulas, converting units as necessary. M2.N.Q.A.1.B

   c. Define and justify appropriate quantities within a context for the purpose of modeling. M2.N.Q.A.1.C

   d. Choose an appropriate level of accuracy when reporting quantities. M2.N.Q.A.1.D

Algebra

Seeing Structure in Expressions

A. Interpret the structure of expressions. M2.A.SSE.A

1. Interpret expressions that represent a quantity in terms of its context. M2.A.SSE.A.1

   a. Interpret parts of an expression, such as terms, factors, and coefficients. M2.A.SSE.A.1.A

   b. Interpret complicated expressions by viewing one or more of their parts as a single entity. M2.A.SSE.A.1.B

Arithmetic with Polynomials and Rational Expressions

A. Perform arithmetic operations on polynomials. M2.A.APR.A

1. Add, subtract, and multiply polynomials. Use these operations to demonstrate that polynomials form a closed system that adhere to the same properties of operations as the integers. M2.A.APR.A.1

B. Understand the relationship between zeros and factors of polynomials. M2.A.APR.B

2. Know and apply the Factor Theorem: For a polynomial p(x) and a number a, p(a) = 0 if and only if (x – a) is a factor of p(x). M2.A.APR.B.2

Creating Equations

A. Create equations that describe numbers or relationships. M2.A.CED.A

1. Create equations and inequalities in one variable and use them to solve problems in a real-world context. M2.A.CED.A.1
2. Create equations and inequalities in two variables to represent relationships between quantities and use them to solve problems in a real world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions. M2.A.CED.A.2
3. Rearrange formulas to isolate a quantity of interest using algebraic reasoning. M2.A.CED.A.3

Reasoning with Equations and Inequalities

A. Understand solving equations as a process of reasoning and explain the reasoning. M2.A.REI.A

1. Understand solving equations as a process of reasoning and explain the reasoning. Construct a viable argument to justify a solution method. M2.A.REI.A.1

B. Solve equations and inequalities in one variable. M2.A.REI.B

2. Solve quadratic equations and inequalities in one variable. M2.A.REI.B.2

   a. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when a quadratic equation has nonreal solutions. M2.A.REI.B.2.A

   b. Solve quadratic inequalities using the graph of the related quadratic equation. M2.A.REI.B.2.B

3. Solve radical equations in one variable and identify extraneous solutions when they exist. M2.A.REI.B.3

C. Solve systems of equations. M2.A.REI.C

4. Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically, graphically, and using technology. M2.A.REI.C.4

D. Represent and solve equations and inequalities graphically. M2.A.REI.D

5. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$. Find approximate solutions by graphing the functions or making a table of values, using technology when appropriate. M2.A.REI.D.5

Functions

Interpreting Functions

A. Understand the concept of function and use function notation. M2.F.IF.A

1. Use function notation. M2.F.IF.A.1

    a. Use function notation to evaluate functions for inputs in their domains, including functions of two variables. M2.F.IF.A.1.A

    b. Interpret statements that use function notation in terms of a context. M2.F.IF.A.1.B

2. Understand geometric formulas as functions. M2.F.IF.A.2

B. Interpret functions that arise in applications in terms of the context. M2.F.IF.B

3. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. M2.F.IF.B.3

4. Relate the domain of a function to its graph and, where applicable, to the context of the function it models. M2.F.IF.B.4

5. Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph. M2.F.IF.B.5

C. Analyze functions using different representation. M2.F.IF.C

6. Graph functions expressed algebraically and show key features of the graph by hand and using technology. M2.F.IF.C.6

7. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. M2.F.IF.C.7

    a. Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context. M2.F.IF.C.7.A

    b. Know and use the properties of exponents to interpret expressions for exponential functions in terms of a real-world context. M2.F.IF.C.7.B

8. Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. M2.F.IF.C.8

    a. Compare properties of two different functions. Functions may be of different types and/or represented in different ways. M2.F.IF.C.8.A

    b. Compare properties of the same function on two different intervals or represented in two different ways. M2.F.IF.C.8.B

Building Functions

A. Build a function that models a relationship between two quantities. M2.F.BF.A

1. Build a function that describes a relationship between two quantities. M2.F.BF.A.1

    a. Combine standard function types using arithmetic operations. M2.F.BF.A.1.A

B. Build new functions from existing functions. M2.F.BF.B

2. Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given graphs. M2.F.BF.B.2

Geometry

Congruence

A. Experiment with transformations in the plane. M2.G.CO.A

1. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not, by hand for basic transformations and using technology for more complex cases. M2.G.CO.A.1
2. Given a rectangle, parallelogram, trapezoid, or regular polygon, determine the transformations that carry the shape onto itself and describe them in terms of the symmetry of the figure. There are no assessment limits for this standard. The entire standard is assessed in this course. M2.G.CO.A.2
3. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. There are no assessment limits for this standard. The entire standard is assessed in this course. M2.G.CO.A.3
4. Given a geometric figure, draw the image of the figure after a sequence of one or more rigid motions, by hand and using technology. Identify a sequence of rigid motions that will carry a given figure onto another. M2.G.CO.A.4

B. Understand congruence in terms of rigid motions. M2.G.CO.B

2. Given a rectangle, parallelogram, trapezoid, or regular polygon, determine the transformations that carry the shape onto itself and describe them in terms of the symmetry of the figure. M2.G.CO.B.2
3. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. M2.G.CO.B.3
4. Given a geometric figure, draw the image of the figure after a sequence of one or more rigid motions, by hand and using technology. Identify a sequence of rigid motions that will carry a given figure onto another. M2.G.CO.B.4
5. Given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent. M2.G.CO.B.5
6. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. M2.G.CO.B.6
7. Explain how the criteria for triangle congruence (ASA, SAS, AAS, SSS, and HL) follow from the definition of congruence in terms of rigid motions. M2.G.CO.B.7

C. Use geometric theorems to justify relationships. M2.G.CO.C

8. Use definitions and theorems about triangles to solve problems and to justify relationships in geometric figures. M2.G.CO.C.8
9. Use definitions and theorems about parallelograms to solve problems and to justify relationships in geometric figures. M2.G.CO.C.9

Similarity, Right Triangles, and Trigonometry

A. Understand similarity in terms of similarity transformations. M2.G.SRT.A

1. Use properties of dilations given by a center and a scale factor to solve problems and to justify relationships in geometric figures. M2.G.SRT.A.1
2. Define similarity in terms of transformations. Use transformations to determine whether two figures are similar. M2.G.SRT.A.2

B. Use similarity to solve problems and justify relationships. M2.G.SRT.B

3. Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures. M2.G.SRT.B.3

Statistics and Probability

Interpreting Categorical and Quantitative Data

A. Summarize, represent, and interpret data on two categorical and quantitative variables. M2.S.ID.A

1. Represent data from two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. M2.S.ID.A.1