Practical Mathematics – Part II

Michigan State Mathematics Content Expectations

Course Description

This course covers basic math skills, with a strong emphasis upon practice and application. Students will learn how to add, subtract, multiply, and divide whole numbers, decimals, and integers. Word problems are used to relate concepts to practice solutions. In this course, students will learn valuable math concepts they will use daily for the rest of their lives.

Text Book

Basic Mathematics through applications

Unit 1 Description

This unit will cover concepts in basics statistics and measurement.

Essential Content and Skills

The learner will:

- Find the mean, median and mode(s) of a list of numbers.
- Find the range of a list of numbers.
- Interpret statistics and use them to solve real world problems.
- Read and interpret tables.
- Read and interpret bar graphs, line graphs, and circle graphs.

Unit 1 Michigan State Content Expectations

Click here to view the Michigan DOE Curriculum Content Standards.

Unit 1 Lesson 1: Basic Statistics Pretest

State Standard	Description
D.RE.04.02 D.AN.05.03	Order a given set of data, find the median, and specify the range of values. Given a set of data, find and interpret the mean (using the concept of fair share) and mode.

Unit 1 Lesson 2: Introduction to Basic Statistics

State Standard	Description
D.RE.04.02 D.AN.05.03	Order a given set of data, find the median, and specify the range of values. Given a set of data, find and interpret the mean (using the concept of fair share) and mode.

Unit 1 Lesson 3: Introduction to Basic Statistics

State Standard	Description
D.RE.04.02 D.AN.05.03	Order a given set of data, find the median, and specify the range of values. Given a set of data, find and interpret the mean (using the concept of fair share) and mode.

Unit 1 Lesson 4: Tables and Graphs

State Standard	Description
D.RE.04.01 D.RE.04.02 D.RE.04.03	Construct tables and bar graphs from given data. Order a given set of data, find the median, and specify the range of values. Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs and read bar graphs showing two data sets.

Unit 1 Lesson 5: Tables and Graphs

State Standard	Description
D.RE.04.01 D.RE.04.02 D.RE.04.03	Construct tables and bar graphs from given data. Order a given set of data, find the median, and specify the range of values. Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs and read bar graphs showing two data sets.

Unit 1 Lesson 6: Measurement Pretest

State Standard	Description
M.TE.04.05	Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations).

Unit 1 Lesson 7: U.S. Customary Units

State Standard	Description
M.TE.04.05	Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations).

Unit 1 Lesson 8: U.S. Customary Units

State Standard	Description
M.TE.04.05	Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations).

Unit 1 Lesson 9: Metric Units and Unit Conversions

State Standard	Description
M.TE.04.05	Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations).

Unit 1 Lesson 10: Metric Units and Unit Conversions

State Standard	Description
M.TE.04.05	Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations).

Unit 2 Description

This unit will focus on signed numbers.

Essential Content and Skills

The learner will:

- Find the opposite and absolute value of a signed number.
- Compare signed numbers.
- Solve application problems involving the comparison of signed numbers.
- Add signed numbers.
- Solve application problems involving the addition of signed numbers.
- Subtract signed numbers.
- Solve application problems involving the subtraction of signed numbers.
- Multiply signed numbers.
- Solve application problems involving the multiplication of signed numbers.
- Divide signed numbers.
- Solve application problems involving the division of signed numbers.

Unit 2 Michigan State Content Expectations

Unit 2 Lesson 1: Pretest/Introduction to Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 2: Introduction to Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 3: Adding Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 4: Adding Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 5: Subtracting Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 6: Subtracting Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 7: Multiplying Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 8: Multiplying Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 9: Dividing Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 2 Lesson 10: Dividing Signed Numbers

State Standard	Description
N.MR.06.08	Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.*
N.MR.06.09	Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.

Unit 3 Description

This unit will focus on solving equations.

Essential Content and Skills

The learner will:

- Translate phrases to expressions, and vice versa.
- Evaluate an expression for a given value of the variable.
- Solve word problems involving expressions.
- Translate sentences to equations involving addition or subtraction.
- Solve addition and subtraction equations.
- Solve word problems involving equations with addition or subtraction.
- Translate sentences to equations involving multiplication or division.
- Solve word problems involving equations with multiplication or division.
- Solve multiplication and division equations.
- Solve simple equations involving signed numbers.
- Solve equations involving two steps.
- Solve word problems involving equations with signed numbers or two steps.
- Combine like terms.
- Solve equations involving like terms.
- Solve word problems with like terms or parentheses.
- Translate a rule to a formula.
- Evaluate formulas.
- Solve word problems using formulas.

Unit 3 Michigan State Content Expectations

Unit 3 Lesson 1: **Pretest / Basic Algebra**

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 2: Basic Algebra

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 3: Solving Addition and Subtraction Equations

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 4: Solving Addition and Subtraction Equations

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 5: Solving Multiplication and Division Equations

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 6: Solving Multiplication and Division Equations

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 7: Solving Two-Step Equations

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 8: Solving Multistep Equations

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 9: Solving Multistep Equations

State Standard	Description
A.FO.06.07	Simplify expressions of the first degree by combining like terms, and evaluate using specific values.
A.PA.07.11	Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
A.F0.07.12	Add, subtract, and multiply simple algebraic expressions of the first degree, e.g., (92x + 8y) – 5x + y, or x(x+2) and justify using properties of real numbers.

Unit 3 Lesson 10: Using Formulas

State Standard	Description
M.TE.05.06	Understand and know how to use the area formula of a triangle: A = bh (where b is length of the base and h is the height), and represent using models and manipulatives.
M.TE.05.07	Understand and know how to use the area formula for a parallelogram: A = bh, and represent using models and manipulatives.

Unit 4 Description

This unit will focus on basic geometry.

Essential Content and Skills

The learner will:

- Identify basic geometric concepts.
- Identify basic geometric figures.
- Solve word problems involving basic geometric concepts and figures.
- Find the perimeter of a polygon.
- Find the circumference of a circle.
- Find the perimeter or circumference of a composite geometric figure.
- Solve word problems involving perimeter or circumference.
- Find the area of a polygon or a circle.
- Find the area of a composite figure.
- Solve word problems involving area.
- Find the volume of a geometric solid.
- Solve word problems involving volume.
- Identify corresponding sides of similar triangles.
- Find the missing sides of similar triangles.
- Solve word problems involving similar triangles.
- Find the square root of a number.
- Find the unknown side of a right triangle using the Pythagorean Theorem.

Unit 4 Michigan State Content Expectations

Unit 4 Lesson 1: Pretest / Introduction to Basic Geometry

State Standard	Description
G.GS.03.01	Identify points, line segments, lines, and distance.
G.TR.05.01	Associate an angle with a certain amount of turning; know that angles are measured in degrees; understand that 90°, 180°, 270°, and 360° are associated respectively, with **14** , **12** , and **34** , and full turns.
G.GS.05.02	Measure angles with a protractor and classify them as acute, right, obtuse, or straight.
G.GS.05.03	Identify and name angles on a straight line and vertical angles.
G.GS.05.04	Find unknown angles in problems involving angles on a straight line, angles surrounding a point, and vertical angles.
G.GS.05.05	Know that angles on a straight line add up to 180° and angles surrounding a point add up to 360°; justify informally by “surrounding” a point with angles.
G.GS.05.06	Understand why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°, and use these properties to solve problems.

M.TE.04.06	Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.
G.GS.05.06	Understand why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°, and use these properties to solve problems. Solve problems about geometric shapes
G.GS.05.07	Find unknown angles and sides using the properties of: triangles, including right, isosceles, and equilateral triangles; parallelograms, including rectangles and rhombuses; and trapezoids.
G.SR.08.03	Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.
G.TR.07.03	Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor.
G.TR.07.04	Solve problems about similar figures and scale drawings.
G.TR.07.05	Show that two triangles are similar using the criteria: corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity); use these criteria to solve problems and to justify arguments.
N.ME.06.16	Understand and use integer exponents, excluding powers of negative bases; express numbers in scientific notation.
N.MR.07.06	Understand the concept of square root and cube root, and estimate using calculators.
N.ME.08.01	Understand the meaning of a square root of a number and its connection to the square whose area is the number; understand the meaning of a cube root and its connection to the volume of a cube.
N.FL.08.05	Estimate and solve problems with square roots and cube roots using calculators.
G.GS.08.01	Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter, area, and volume problems.

Unit 4 Lesson 2: Introduction to Basic Geometry

State Standard	Description
G.GS.03.01	Identify points, line segments, lines, and distance.
G.TR.05.01	Associate an angle with a certain amount of turning; know that angles are measured in degrees; understand that 90°, 180°, 270°, and 360° are associated respectively, with **14** , **12** , and **34** , and full turns.
G.GS.05.02	Measure angles with a protractor and classify them as acute, right, obtuse, or straight.
G.GS.05.03	Identify and name angles on a straight line and vertical angles.
G.GS.05.04	Find unknown angles in problems involving angles on a straight line, angles surrounding a point, and vertical angles.
G.GS.05.05	Know that angles on a straight line add up to 180° and angles surrounding a point add up to 360°; justify informally by “surrounding” a point with angles.
G.GS.05.06	Understand why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°, and use these properties to solve problems.

Unit 4 Lesson 3: **Perimeter and Circumference**

State Standard	Description
M.TE.04.06	Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.
G.GS.05.06	Understand why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°, and use these properties to solve problems. Solve problems about geometric shapes
G.GS.05.07	Find unknown angles and sides using the properties of: triangles, including right, isosceles, and equilateral triangles; parallelograms, including rectangles and rhombuses; and trapezoids.
G.SR.08.03	Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.

Unit 4 Lesson 4: **Perimeter and Circumference**

State Standard	Description
M.TE.04.06	Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.
G.GS.05.06	Understand why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°, and use these properties to solve problems. Solve problems about geometric shapes
G.GS.05.07	Find unknown angles and sides using the properties of: triangles, including right, isosceles, and equilateral triangles; parallelograms, including rectangles and rhombuses; and trapezoids.
G.SR.08.03	Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.

Unit 4 Lesson 5: Area

State Standard	Description
M.TE.04.06	Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.
M.TE.05.06	Understand and know how to use the area formula of a triangle: A = bh (where b is length of the base and h is the height), and represent using models and manipulatives.
M.TE.05.07	Understand and know how to use the area formula for a parallelogram: A = bh, and represent using models and manipulatives.
M.TE.06.03	Compute the volume and surface area of cubes and rectangular prisms given the lengths of their sides, using formulas.
G.SR.08.06	Know the volume formulas for generalized cylinders (area of base) x height), generalized cones and pyramids ((area of base) x height), and spheres (p (radius) 3) and apply them to solve problems.
G.SR.08.07	Understand the concept of surface area, and find the surface area of prisms, cones, spheres, pyramids, and cylinders.

Unit 4 Lesson 6: Area

State Standard	Description
M.TE.04.06	Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.
M.TE.05.06	Understand and know how to use the area formula of a triangle: A = bh (where b is length of the base and h is the height), and represent using models and manipulatives.
M.TE.05.07	Understand and know how to use the area formula for a parallelogram: A = bh, and represent using models and manipulatives.
M.TE.06.03	Compute the volume and surface area of cubes and rectangular prisms given the lengths of their sides, using formulas.
G.SR.08.06	Know the volume formulas for generalized cylinders (area of base) x height), generalized cones and pyramids ((area of base) x height), and spheres (p (radius) 3) and apply them to solve problems.
G.SR.08.07	Understand the concept of surface area, and find the surface area of prisms, cones, spheres, pyramids, and cylinders.

Unit 4 Lesson 7: Volume

State Standard	Description
M.TE.06.03	Compute the volume and surface area of cubes and rectangular prisms given the lengths of their sides, using formulas.
G.SR.08.06	Know the volume formulas for generalized cylinders (area of base) x height), generalized cones and pyramids ((area of base) x height), and spheres (p (radius) 3) and apply them to solve problems.
G.SR.08.07	Understand the concept of surface area, and find the surface area of prisms, cones, spheres, pyramids, and cylinders.

Unit 4 Lesson 8: Similar Triangles

State Standard	Description
G.TR.07.03	Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor.
G.TR.07.04	Solve problems about similar figures and scale drawings.
G.TR.07.05	Show that two triangles are similar using the criteria: corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity); use these criteria to solve problems and to justify arguments.

Unit 4 Lesson 9: Square Roots and the Pythagorean Theorem

State Standard	Description
N.ME.06.16	Understand and use integer exponents, excluding powers of negative bases; express numbers in scientific notation.
N.MR.07.06	Understand the concept of square root and cube root, and estimate using calculators.
N.ME.08.01	Understand the meaning of a square root of a number and its connection to the square whose area is the number; understand the meaning of a cube root and its connection to the volume of a cube.
N.FL.08.05	Estimate and solve problems with square roots and cube roots using calculators.
G.GS.08.01	Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter, area, and volume problems.

Unit 4 Lesson 10: Square Roots and the Pythagorean Theorem

State Standard	Description
N.ME.06.16	Understand and use integer exponents, excluding powers of negative bases; express numbers in scientific notation.
N.MR.07.06	Understand the concept of square root and cube root, and estimate using calculators.
N.ME.08.01	Understand the meaning of a square root of a number and its connection to the square whose area is the number; understand the meaning of a cube root and its connection to the volume of a cube.
N.FL.08.05	Estimate and solve problems with square roots and cube roots using calculators.
G.GS.08.01	Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter, area, and volume problems.