June, 2008

Mathematics Alignment Guide
Mason-Lake Tech Prep
Course: Electronics Technology

*** *Note: If a standard is covered partially, then the part that is covered is underlined.*

High School Content Expectations							
Standard	Level of Coverage		Activities Linked to this Standard	Assessment Method		Assessment Correlation	Approximate Time Spent on the Standard
	Partial	Complete		Performance Based	Written		
L1.2.4 Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.	x		Students build a circuit and take measurements for voltage, current and resistance. Students do this for multiple circuits, look for patterns, and find total resistance, voltage, current, and power using calculations.	x		Students demonstrate proficiency through building an experimental circuit, recording data, finding patterns and making calculations.	3 hours
L2.3.1 Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.	x		1) Students convert units within the metric unit system (e.g. micro, milli, kilo, etc.). 2) Students use dimensional analysis to convert ratio quantities and must carry the correct units through the calculations (e.g. kW/hr, A/hr, etc.).		x	Students demonstrate proficiency on quizzes and a test.	Students use this process throughout approximately ½ the school year

L2.4.2 Describe and explain round-off error, rounding, and truncating.	x		Students report information to the hundredths place after doing calculations and determining the correct metric unit of measure for reporting the information. They understand that their calculations must carry decimal places beyond the hundredths place for accuracy. Students round answers accordingly.	x	x	Students demonstrate proficiency of this concept in a lab setting, on quizzes, and a test.	Students use this process throughout approximately ½ the school year
L3.2.2 Use the connectives "NOT," "AND," "OR," and "IF…,THEN," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives.	x		1) Students set up a truth table based on the 6 basic logic gates. 2) Students negate "or" statements using "nor" statements.	x	x	Students demonstrate proficiency on in-class lab activities. Students are assessed on a test.	Approximately 4 class periods
A1.1.1 Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables.		x	Students set up parallel, series, and complex circuits from a verbal description (or schematic diagram) and calculate total resistance, voltage drops and/or current flows.	x	x	Students demonstrate proficiency on in-class labs, quizzes and a test.	Approximately 12 weeks

A1.2.1 Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.	x		Students use and solve equations such as Ohm's Law, Watt's Law, Kirchoff's Laws.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
A1.2.3 Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately.	x		Students solve linear and quadratic equations in applied settings such as E=IR and $P = I^2R$.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable, and justify steps in the solution.		x	Students solve the equations for parallel circuit resistance for variables within the equation.		x	Students demonstrate proficiency on a quiz.	Approximately 1 hour
A1.2.9 Know common formulas and apply appropriately in contextual situations		x	Students know common formulas in electronics (such as Ohm's Law, Watt's Law, and Kirchoff's Law) and apply this is appropriate situations.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Embedded within approximately ½ the year

A2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations.	x		Students use an oscilloscope. They translate information verbally from the graph of the sine wave. Students calculate the frequencies and amplitudes of the sine wave.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 3 – 6 hours
A3.7.4 Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima.	x		Students identify the range, amplitude, maximum and minimum of a sine graph.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 3 – 6 hours

ACT Standards							
Perform one-operation computation with whole numbers and decimals (Range 13 – 15)		x	Students add, subtract, multiply, and divide with whole numbers and decimals while solving equations.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout the school year
Perform common conversions (e.g., inches to feet or hours to minutes) (Range 13 – 15)		x	1) Students convert units within the metric unit system (e.g. micro, milli, kilo, etc.). 2) Students use dimensional analysis to convert ratio quantities and must carry the correct units through the calculations (e.g. kW/hr, A/hr, etc.).		x	Students demonstrate proficiency on quizzes and a test.	Students use this process throughout approximately ½ the school year
Solve problems in one or two steps using whole numbers (Range 13 – 15)		x	Students add, subtract, multiply, and divide and do combinations of these processes with whole numbers while solving equations.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout the school year
Perform a single computation using information from a table or chart (Range 13 – 15)		x	Students build a circuit and take measurements for voltage, current and resistance. Students do this for multiple circuits, look for patterns, and find total resistance, voltage, current, and power using calculations.	x		Students demonstrate proficiency through building an experimental circuit, recording data, finding patterns and making calculations.	3 hours

Exhibit knowledge of basic expressions (e.g., identify an expression for a total as b + g) (Range 13 – 15)		x	Students write expressions and calculate totals for Kirchoff's Law's for series and parallel circuits.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Solve equations in the form x + a = b, where a and b are whole numbers or decimals (Range 13 – 15)		x	Students solve Kirchoff's Law's equations for the unknown in circuits using whole numbers and decimals.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 7 weeks
Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent (Range 16 – 19)		x	Students add, subtract, multiply, and divide with whole numbers. fractions, and decimals while solving equations.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout the school year
Solve some routine two-step arithmetic problems (Range 16 – 19)		x	Students perform multi-step addition, subtraction, multiplication, and division with whole numbers, fractions, and decimals while solving equations applied to circuits.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout the school year
Read tables and graphs (Range 16 – 19)		x	Students read graphs of sine waves and zener diode characteristics. Students read truth tables.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	3 hours

Perform computations on data from tables and graphs (Range 16 – 19)		x	Students build a circuit and take measurements for voltage, current and resistance. Students do this for multiple circuits, look for patterns, and find total resistance, voltage, current, and power using calculations.	x		Students demonstrate proficiency through building an experimental circuit, recording data, finding patterns and making calculations.	3 hours
Identify a digit's place value (Range 16 – 19)		x	Students find the place values of numbers during beginning work with conversions between units; particularly with metric units. Students relate prefixes of units to the place value of the number.		x	Students demonstrate proficiency on assignments, quizzes, and tests.	Introduced explicitly for one class period, referred to and used for approximately 2 weeks and embedded in metric conversions throughout the year
Substitute whole numbers for unknown quantities to evaluate expressions (Range 16 – 19)		x	Students use equations such as Ohm's Law, Watt's Law, Kirchoff's Laws and substitute in known values to determine unknowns.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Solve one-step equations having integer or decimal answers (Range 16 – 19)		x	Students use and solve equations such as Ohm's Law and Watt's Law using both integers and decimals.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks

Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average (Range 20 – 23)		x	1) Students use equations such as Ohm's Law, Watt's Law, Kirchoff's Laws and substitute in known values to determine unknowns. 2) Students solve proportions and ratios using transformer turns, voltage, and current ratios.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 13 weeks
Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor (Range 20 – 23)	x		1) Students must report information to the hundredths place after doing calculations and determining the correct metric unit of measure for reporting the information. They need to understand that their calculations must carry decimal places beyond the hundredths place for accuracy. Students round answers accordingly. 2) Students look for patterns in sine graphs and relate them to contextual situations. 3) Students understand that the ordering of decimals is used for determining the proper resistor size selection in a circuit.	x	x	Students demonstrate proficiency of this concept in a lab setting, on quizzes, and a test.	Students use this process throughout approximately ½ the school year

Evaluate algebraic expressions by substituting integers for unknown quantities (Range 20 – 23)		x	Students use equations such as Ohm's Law, Watt's Law, Kirchoff's Laws and substitute in known values to determine unknowns.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Solve routine first-degree equations (Range 20 – 23)		x	Students use equations such as Ohm's Law, Watt's Law, Kirchoff's Laws and substitute in known values to determine unknowns.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Perform straightforward word-to-symbol translations (Range 20 -23)		x	Given parameters for two variables in Ohm's law through a verbal description, students write the symbolic representation and solve the equation.	x	x	Students demonstrate proficiency on in-class labs, assignments, quizzes, and a test.	Approximately 12 weeks
Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) (Range 20 – 23)	x		Students exhibit knowledge of the relationship between angle measures and the sine graphs.	x	x	Assessment is embedded in larger concepts of uses of sine graphs.	Approximately 3 – 6 hours
Manipulate data from tables and graphs. (Range 24 – 27)	x		Students build a circuit and take measurements for voltage, current and resistance. Students do this for multiple circuits, look for patterns, and find total resistance, voltage, current, and power using calculations.	x		Students demonstrate proficiency through building an experimental circuit, recording data, finding patterns and making calculations.	Approximately 3 hours

Work with scientific notation (Range 24 – 27)		x	Students do calculations with numbers in scientific notation and then convert numbers from scientific notation to engineering notation and then to metric measures.	x	x	Students demonstrate proficiency on in-class labs quizzes and on a test.	Students use this process throughout approximately ½ the school year
Solve real-world problems using first-degree equations (Range 24 – 27)		x	Students use equations such as Ohm's Law, Watt's Law, Kirchoff's Laws and substitute in known values to determine unknowns.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions) (Range 24 – 27)	x		1) Students use equations such as Ohm's Law, Watt's Law, Kirchoff's Laws and substitute in known values to determine unknowns. 2) Students solve proportions and ratios using transformer turns, voltage, and current ratios.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 13 weeks
Interpret and use information from figures, tables, and graphs (Range 28 – 32)	x		1) Students interpret and use information from sine graphs. 2) Students use and interpret data from electronic and electrical symbols.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Used in various ways periodically throughout the year

Manipulate expressions and equations (Range 28 – 32)		x	1) Students use equations such as Ohm's Law, Watt's Law, Kirchoff's Laws and substitute in known values to determine unknowns. 2) Students solve proportions and ratios using transformer turns, voltage, and current ratios. 3) Students transpose Ohm's Law and Watt's Law to solve for the unknown.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 13 weeks
Interpret and use information from graphs in the coordinate plane (Range 28 – 32)		x	1) Students interpret information from the graph of the universal time constant for determining percentages of charge and discharge values. 2) Students interpret and use information from sine graphs.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Used in various ways periodically throughout the year

Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings) (Range 33 – 36)	x		1) Students solve proportions and ratios using transformer turns, voltage, and current ratios. 2) Students use Ohm's Law, Watt's Law, and Kirchoff's Laws to solve complex arithmetic problems.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 13 weeks
Analyze and draw conclusions based on information from figures, tables, and Graphs (Range 33 – 36)		x	1) Students interpret information from the graph of the universal time constant for determining percentages of charge and discharge values. 2) Students interpret and use information from sine graphs. 3) Students build a circuit and take measurements for voltage, current and resistance. Students do this for multiple circuits, look for patterns, and calculate total resistance, voltage, current, and power.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Used in various ways periodically throughout the year

Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers (Range 33 – 36)		x	Using Ohm's Law, students need to understand if quantities are directly proportional or inversely proportional. Students predict how changes in one quantity impacts changes in related quantities. (e.g. If voltage doubles, what happens to the current?)	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Write expressions that require planning and/or manipulating to accurately model a situation (Range 33 – 36)		x	Students write expressions for resistance to model series, parallel, or compound circuits.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Draw conclusions based on a set of conditions (Range 33 – 36)		x	This concept is incorporated into various parts of the course. For example: 1) based on a set of conditions, students will determine if a transistor is in a state of conduction, 2) students use conditions from the universal time constant graphs to determine if a capacitor is fully charged or fully discharged.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Used in various ways periodically throughout the year

WorkKeys Standards							
Solve problems that require a single type of mathematics operation (addition, subtraction, multiplication, and division) using whole numbers (Level 3)		x	Students add, subtract, multiply, and divide with whole numbers while solving equations.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout the school year
Change numbers from one form to another using whole numbers, fractions, decimals, or percentages (Level 3)	x		Students do calculations with numbers in scientific notation and then convert numbers from scientific notation to engineering notation and then to metric measures.	x	x	Students demonstrate proficiency on in-class labs quizzes and on a test.	Students use this process throughout approximately ½ the school year
Solve problems that require one or two operations (Level 4)		x	Students add, subtract, multiply, and divide and do combinations of these processes with whole numbers and decimals while solving equations.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout the school year
Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals (Level 4)	x		Students solve proportions and ratios using transformer turns, voltage, and current ratios.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 13 weeks

Add commonly known fractions, decimals, or percentages (e.g., 1/2, .75, 25%) (Level 4)	x		Students add commonly known decimals when simplifying expressions that involve reciprocals of whole number resistances.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 12 weeks
Decide what information, calculations, or unit conversions to use to solve the problem (Level 5)		x	Students determine what types of information they need to set up equations to solve for unknowns. Students determine which formula is appropriate for solving for the unknown based on the quantities that are known.		x	Students demonstrate proficiency on quizzes and a test.	Students use this process throughout approximately ½ the school year
Look up a formula and perform single-step conversions within or between systems of measurement (Level 5)	x		Students convert units within the metric unit system (e.g. micro, milli, kilo, etc.).	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout approximately ½ the school year
Calculate using mixed units (e.g., 3.5 hours and 4 hours 30 minutes) (Level 5)		x	Students calculate using mixed units within metric conversions (e.g. milli, micro, kilo, etc.).	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Students use this process throughout approximately ½ the school year

Use fractions, negative numbers, ratios, percentages, or mixed numbers (Level 6)	x		1) Students use ratios with transformer turns, voltage, and current ratios. 2) Students use percentages with the universal time constant curve. 3) Students use mixed numbers when determining specified lengths for stripping wires and cables.	x		Students demonstrate proficiency on in-class labs.	Approximately 3 weeks
Rearrange a formula before solving a problem (Level 6)		x	Students transpose Ohm's Law and Watt's Law to solve for the unknown.	x	x	Students demonstrate proficiency on in-class labs, quizzes, and a test.	Approximately 13 weeks
Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages (Level 7)	x		1) Students convert units within the metric unit system (e.g. micro, milli, kilo, etc.). 2) Students use dimensional analysis to convert ratio quantities and must carry the correct units through the calculations (e.g. kW/hr, A/hr, etc.).		x	Students demonstrate proficiency on quizzes and a test.	Students use this process throughout approximately ½ the school year

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