MATH *Connections* Correlation to Vermont Standards

Correlation Key: **"X" Coverage = Secondary concept of the activity or problem. Students gain a basic understanding or introduction of the concept.** **"XX" In-depth coverage = Primary concept that is the focus of the activity or problem. Students gain thorough understanding of the concept.**	**MATH *Connections* 1A**				**MATH *Connections* 1B**				**MATH *Connections* 2A**			**MATH *Connections* 2B**			**MATH *Connections* 3A**				**MATH *Connections* 3B**			
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Science, Mathematics, and Technology Standards																						
Inquiry, Experimentation, and Theory																						
Investigation																						
7.2 Students design and conduct a variety of their own investigations and projects. These should include:																						
• Questions that can be studied using the resources available.	XX		XX			XX		XX		XX	XX	XX	XX		XX	XX	XX	XX			XX	
• Procedures that are safe, humane, and ethical.	XX		XX			XX		XX		XX	XX	XX	XX		XX	XX	XX	XX			XX	
• Data that are collected and recorded in ways that others can verify.	XX		XX			XX		XX		XX	XX	XX	XX		XX	XX	XX	XX			XX	
• Data and results that are represented in ways that address the question at hand.	XX		XX			XX		XX		XX	XX	XX	XX		XX	XX	XX	XX			XX	
• Recommendations, decisions, and conclusions that are based on evidence, and that acknowledge references and contributions of others.	XX																					
• Results that are communicated appropriately to audiences.	X																					
• Reflections and defense of conclusions and recommendations from other sources, and peer review.	X																					
This is evident when students:																						
fff. Complete a mathematical model of physical phenomena, employing methods of structural analysis.			XX	X		X			XX			X	X			XX	XX					
h. Study decision options in business or public planning that involve issues of optimizations, trade-off, cost-benefit projections, and risks.		X										XX	X	XX	XX	XX			XX			
i. Complete a historical study, tracing the development of a mathematical or scientific concept and the people connected with it.								X			X	X	XX								XX	XX
Theory																						
7.3 Students understand the nature of mathematical, scientific, and technological theory. This is evident when students:																						
bb. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.	X	XX	X	X	X			X			XX	XX	XX		XX	XX	XX		X	X	XX	XX

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cc. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.	X		X										X					XX				XX
aaa. Use principles and observations to formulate theory and to explain or predict phenomena.	X	X	X	XX			XX	XX			XX	XX	XX		XX	XX	XX	XX				
History of Science, Mathematics, and Technology																						
7.4 Students understand the history of science, mathematics, and technology. This is evident when students:																						
a. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.	X	X	X	X	X	X	X	X	X	X	X	XX	XX	X	X	X	X	X	X	X	X	XX
aa. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present, and future understanding.								X				X	XX					X		X		XX
Roles and Responsibilities																						
7.5 Students analyze the roles and responsibilities of scientists, mathematicians, and technologists in social, economic, cultural, and political systems. This is evident when students:																						
aaa. Analyze the impact of scientific, mathematical, and technological investigations into and findings about human society, including the ethical issues involved (e.g., the dangers and benefits of genetic engineering).				XX	X													XX				
Mathematical Understanding																						
Arithmetic, Number, and Operation Concepts																						
7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:																						
cc. Show a sense of the magnitudes and relative magnitudes of numbers, and the helpful role of scientific notation.		XX					XX									XX		XX	XX			
d. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	
e. Use knowledge of the place value system to solve problems.		XX	XX				XX									XX		XX	XX		XX	
aaa. Understand and use number systems: natural, whole, integer, rational, real and complex.		X				X														X	XX	

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bbb. Represent numbers in decimal or fraction form and in scientific notation, and graph numbers on the number line in the coordinate plane.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	
ff. Understand and use unitary operations (e.g., opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm).	XX	XX			X				XX	XX			XX		XX	XX				XX	XX	
gg. Use dimensionless numbers (e.g., factors, proportions, and percents) and numbers with specific units of measure, including length, time, and rate units.	X	XX	XX	XX	XX	XX			XX	XX	XX	XX	XX	X	XX	XX	XX					
hh. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change.	XX		XX					XX	XX	XX								XX	XX	XX	XX	
i. Understand the interrelationship of the four binary arithmetic operations, and use the properties of these operations in forming and working with algebraic expressions.		XX	X	X	X	X	XX		XX	X	X	X	X	X	X	X	X	X	X	XX	X	
j. Recognize and represent basic number patterns.		XX	X			XX	XX								X						XX	
k. Show facility with the mechanics of unitary and binary operations, along with an understanding of their typical meanings and uses in applications;	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	
l. Carry out counting procedures such as those involving sets (unions and intersections).							XX	XX										XX		XX		
Geometric and Measurement Concepts																						
7.7 Students use geometric and measurement concepts. This is evident when students:																						
gg. Analyze and generalize geometric patterns.									XX	XX		XX	XX		XX				XX			
aaa. Understand the properties of figures relating to shape, size, location, direction, and orientation.									XX	XX		XX	XX									
bbb. Work with basic types of solid and plane figures, and with geometric patterns involving such figures.									XX	XX		XX	XX		XX				XX			
ccc. Use relationships between figures that involve congruence, similarity, projections, and transformations.										XX	XX	X	X									
ddd. Use quotient measures (e.g., slope and "per unit" amounts) and product measures (e.g., person-days).		XX	XX	XX	XX	XX			XX	XX	XX	XX	XX	XX	XX	XX	XX		XX			
eee. Know, use, and derive formulas for area and volume of many kinds of figures.									XX			XX	XX									
fff. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy, and error analysis.	X	XX	X	XX	X	XX			XX	XX	X	XX	XX			X	X				XX	

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ii. Analyze geometric figures and prove things about them using deductive methods and using the Pythagorean Theorem to solve problems.									XX	XX	X	XX	XX						XX			XX
j. Understand the structure of standard measurement systems (Si {Standard International} and customary), including basic geometric and non-geometric measures.		X	XX			XX			X	X	X	X	X			X						
k. Present graphs and figures.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
l. Compares slope (rise-over-run) and the angle of elevation as measures of steepness.			XX							XX	XX											
Function and Algebra Concepts																						
7.8 Students use function and algebra concepts. This is evident when students:																						
aaa. Use functions to represent patterns.						XX					X	X			XX	XX	XX	XX			XX	
bbb. Represent functional relationships in formulas, tables, and graphs, and translate among these; model given situations with functions, and interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another (dependent and independent variable relationships); use basic types of functions (linear, exponential, periodic, power, rational, square, square roots, cubes and cube roots); work with properties and mechanics of functions (evaluation, inverse, slope, local maxima and minima).						XX									XX	XX	XX	XX			X	
ccc. Define and use variables, parameters, constants, and unknowns in work with both functions and equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves such as circles, ellipses, parabolas, and hyperbolas;		XX	XX	XX	XX	XX	X		X	X	X	XX	X	XX	XX	XX	XX	XX	XX	X	XX	
d. Understand the basic algebraic structure of number systems		XX												XX						XX		
e. Understand rate relationships in constant rate situations		XX	XX	XX	XX	XX			XX						XX							
f. Use arithmetic and geometric sequences						XX															XX	
g. Use right triangle trigonometric functions to model real-world phenomena.											XX						XX					

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Statistics and Probability Concepts																						
7.9 Students use statistics and probability concepts. This is evident when students:																						
aaa. Analyze single-variable data using frequency distribution histograms, and summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.	XX			XX	XX							X				XX	XX	XX				
bbb. Work with normal distribution in some of its basic uses																		XX				
ccc. Explore questions of experimental design, use of control groups, and reliability.	X							XX										XX				
ddd. Find all possible combinations, arrangements, and/or permutations within given constraints; use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.							XX	XX										XX				
ee. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.								XX										XX				
Mathematical Problem-Solving and Reasoning																						
Applications																						
7.10 Students use concrete, formal, and informal strategies to solve mathematical problems, apply the process of mathematical modeling, and extend and generalize mathematical concepts. Students apply mathematics as they solve scientific and technological problems or work with technological systems. This is evident when students:																						
f. Make sensible, reasonable estimates.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	
aa. Formulate and solve meaningful problems in many kinds of situations using grade-related mathematical concepts and reasoning strategies.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
bbb. Formulate and carry out detailed solutions to complex problems, using appropriate problem-solving techniques.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

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ccc. Carry out a systematic analysis of different possibilities in a complex situation; create and test mathematical models of given situations; use basic principles of mathematical proof and reasoning in solving a variety of problems; identify interesting problems in a situation with minimal guidance, and pursue these problems by asking and answering appropriate questions.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
ddd. Approach a relatively unfamiliar situation and explore its mathematically interesting aspects.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
eee. Work to extend specific results and generalize from them.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
gg. Gather evidence for conjectures and formulate proofs for them; understand the difference between supportive examples and proof.	X	XX	X		X		X	XX	X	XX	XX	XX	XX		XX	X	XX	X	X	XX	XX	XX