

Below are the Connecticut Standards of Learning in Math, Technology, Social Studies, and Science and arranged by competency area and Grade. The Standards are checked (✓) to identify the extent to which TRAC PAC 2 modules relate to the Connecticut Standards.

# Grade 8

## MATH - Grade 8: Numerical and Proportional Reasoning

<b>Between any two rational numbers, another rational number can always be found.</b>										
✓	✓			✓			✓			Locate, label and order rational numbers on number lines, scales, coordinate grids and measurement tools.
✓	✓			✓			✓			Write a rational number in equivalent notation forms as a fraction, mixed number, improper fraction, decimal, ratio, percent, expanded form, powers of ten and scientific notation.
✓	✓			✓			✓			Use order of operations, the distributive, associative, and commutative properties, identities and inverses to simplify computations with rational numbers and to write and solve multi-step problems in a variety of contexts.
✓	✓			✓			✓			Estimate reasonable answers and solve a variety of problems involving multi-step operations with rational numbers in various notation forms.
✓	✓			✓			✓			Use and describe methods for estimating and judging the reasonableness of computations with rational numbers.
✓	✓			✓			✓			Recognize the value and limitations of estimates and assess the amount of error resulting from estimates.
<b>The equivalence of fractions, decimals, ratios and percents can be used to solve problems.</b>										
✓	✓			✓			✓			Choose and use a variety of linear, area and set models to demonstrate the equivalence of fractions, decimals, ratios and percents.
✓	✓			✓			✓			Estimate and solve percent problems involving percents that are more than 100% and less than 1%.
✓	✓			✓			✓			Estimate and solve problems involving percent increase and decrease.
✓	✓			✓			✓			Write expressions and equations to solve a variety of multi-step problems and explain solution steps.
<b>Number lines and grids can be used to compare, and order integers, powers and roots.</b>										
✓	✓			✓			✓			Identify, locate on number lines and grids, compare, order and use integers, powers and roots.
✓	✓			✓			✓			Solve a variety of problems involving integers, powers, roots, absolute value and scientific notation.
<b>Multiplication, division and power properties of exponents can simplify calculations with expressions and scientific notation.</b>										
✓	✓			✓			✓			Use the rules for exponents to multiply and divide with powers of ten, including negative exponents.
✓	✓			✓			✓			Develop, describe and use a variety of methods to estimate and calculate mentally with very large and very small numbers.
<b>Exponential growth and decay models are based on repeatedly multiplying by the same factor.</b>										
										Solve problems that involve repetitive patterns and iterations, such as compound interest, using tables, spreadsheets and calculators.

## MATH - Grade 8: Algebraic Reasoning

<b>Algebraic methods (tables, graphs and equations) can be used to solve real-world problems.</b>										
✓	✓	✓	✓	✓	✓					Use tables, graphs and equations to represent mathematical relationships and solve real-world equations.
✓	✓	✓	✓	✓	✓					Given a system of linear equations with one point of intersection, recognize that a variety of methods may be used to find the solution, including algebraic and graphical methods.
<b>A relation is a mapping from one set of values to another, and a function is a relation in which there is only one value of the dependent variable that corresponds to each value of the independent variable.</b>										
					✓					Identify functions as linear and nonlinear and compare and contrast their properties using tables, graphs and equations.
										Explore solving problems involving direct variation.
<b>Given one representation or function, other representations can be derived.</b>										
										Use a graphing calculator to represent and to describe a linear function with tables, patterns, graphs and equations.
<b>A common solution to two linear equations is shown graphically by the intersection of their lines.</b>										
										Recognize that on the coordinate plane, lines with the same slope are parallel and lines with different slopes intersect.
										Given a system of two linear equations, identify whether they represent pairs of lines that have none, one or infinitely many points of intersection.

## MATH - Grade 8: Geometry & Measurement

<b>Relationships exist among sides, angles, perimeters, areas, surface areas and volumes of congruent and similar polygons and solids.</b>										
										Make and test conjectures about relationships among sides, angles, perimeters, areas, surface areas and volumes of congruent and similar polygons and solids.
										Explain the effect of scale factors on the length, area, and volume ratios of similar polygons and solids.
										Investigate the diameter and height relationships among the volumes of cylinders, cones and spheres.
<b>Indirect measures of volume for some solids can be found through the use of formulas. Direct measure of the volume of irregular solid objects can be accomplished through the use of displacement.</b>										
										Estimate, measure, derive and use formulas and strategies to find the perimeter, area, surface area and volume of various regular and irregular polygons and solids.
										Represent the numerical and geometrical relationships of surface area and volume of solids using nets and formulas.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe the accuracy of estimates and measures and the precision of measurement tools.
				✓	✓					Explore velocity and density and solve simple dimensional analysis problems involving rates.
<b>The Pythagorean Theorem can be used to find an unknown length.</b>										
										Explore the relationship of the sides of triangles and the area of squares constructed off each side. Deduce and apply the Pythagorean theorem to solve indirect measurement problems.

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## Geometric constructions can model relationships.

✓	✓						✓									Use coordinate geometry to explore and test relationships of parallel and perpendicular lines, congruence, similarity and transformations.
✓	✓						✓									Explore reflection, rotation and translation of polygons with line and rotational symmetry and find a single transformation that will produce the same result as a series of transformations.
✓	✓						✓									Describe relationships such as parallels, perpendiculars, bisections, medians and mid-segments and how the same relationships are related to the slope and intersection of lines on the coordinate grid.

## MATH - Grade 8: Working with Data: Probability and Statistics

Graphic models such as a line or a curve can be used as predictive tools even though they may not exactly fit real data situations.

✓	✓					✓										Use technology to collect, organize, display, compare, make predictions and analyze the results of large data sets.
✓	✓					✓										Construct scatter plots and evaluate the effects of variables using line-of-best-fit.
✓	✓					✓										Make inferences, formulate and evaluate hypotheses and conclusions based on experimental data for independent and dependent events. Compare data to predictions and to theoretical expectations.

Data sets can be compared using box-and-whisker plots which show range, median and quartile information.

							✓									Construct a variety of data displays, including box-and-whisker plots, where measures of central tendency and dispersion are found in graphical displays.
																Analyze and interpret data using descriptive statistics including range, mode, median, quartiles, outliers and mean.
							✓									The choice of the sample and its size can affect statistical claims.
																Describe the role of random sampling, random number generation and the effects of sample size in statistical claims.

Tree diagrams and networks illustrate that counting principles are multiplicative.

																Use combinations and permutations, trees, networks (counting strategies) in a variety of contexts, and identify when order is irrelevant in determining a solution.
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## SCIENCE - Grade 8: Core Scientific Inquiry, Literacy and Numeracy

An object's inertia causes it to continue moving the way it is moving unless it is acted upon by a force to change its motion.

			✓	✓			✓									Calculate average speed of a moving object and illustrate the motion of objects in graphs of distance over time.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe the qualitative relationships among force, mass and changes in motion.
			✓	✓												Describe the forces acting on an object moving in a circular path.

Reproduction is a characteristic of living systems and it is essential for the continuation of every species.

																Explain the similarities and differences in cell division in somatic and germ cells.
																Describe the structure and function of the male and female human reproduction system, including the process of egg and sperm production.
																Describe the structure of the genes on chromosomes, and explain sex determination in humans.

The solar system is composed of planets and other objects that orbit the sun.

																Explain the effect of gravity on the orbital movement of planets in the solar system.
																Explain how the regular motion of the Sun, Earth and Moon explains the seasons, phases of the moon and eclipses.

In the design of structures there is a need to consider factors such as function, materials, safety, cost and appearance.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explain how beam, truss and suspension bridges are designed to withstand the forces that act on them.
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## TECH ED - Grades 5-8 - Economics

Students will understand the link between technology and the economy, and recognize that link as the force behind societal emergence and evolution.

✓		✓	✓		✓	✓	✓									Describe how societies are organized to produce and distribute goods and services in a structured manner.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe how society uses resources and distributes its goods and services.
		✓	✓			✓	✓	✓								Describe how a business produces profit.
			✓			✓	✓	✓								Describe the major economic and political systems in relation to techno-logical activity.
			✓			✓	✓	✓								Identify three types of businesses.
✓	✓	✓			✓	✓	✓									Describe free enterprise.
			✓			✓	✓	✓								Analyze a product for its ability to satisfy consumer demands.
			✓			✓	✓	✓								Develop skills in making wise consumer decisions.
			✓			✓	✓	✓								Discuss the global market/ economy and understand its effects on the United States.

## TECH ED - Grades 5-8 - Technological Impact

Students will understand the impact that technology has on the social, cultural and environmental aspects of their lives.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explain how technology has expected and unexpected effects.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore personal, societal, economic and environmental effects of technological systems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Trace the historical development of at least one technology, identifying its effects and hypothesizing about its future.
✓	✓			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify the social and economic impacts of automation and computer-controlled processing.
																Describe the universal input, process, output, feedback (IPOF) systems model.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop criteria for evaluating technology.

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<i>Bridge Builder</i>	<i>Design &amp; Construction</i>	<i>Environmental</i>	<i>Madlex</i>	<i>Motion</i>	<i>Highway Safety</i>	<i>SinCity</i>	<i>Traffic Technology</i>	<i>GPS 101</i>	<i>Cantilever Beam</i>	<i>Jeopardy</i>
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Identify and describe how individual technological innovations may be combined to create new technologies.

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## TECH ED - Grades 5-8 - Career Awareness

Students will become aware of the world of work and its function in society, diversity, expectations, trends and requirements.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe how technological development affects careers and occupations.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Demonstrate awareness of changes in job requirements over time.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe strategies for assuming responsibility.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop personal responsibility and accountability in the workplace.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Define and discuss personal and professional ethics.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Discuss coping strategies for change.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify expectations in the workplace.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Define and discuss the concept of "work ethic."
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore career options.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Define and discuss "career path."

## TECH ED - Grades 5-8 - Problem Solving/Research & Development

Students will recognize technology as the result of a creative act, and will be able to apply disciplined problem-solving strategies to enhance invention and innovation.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Differentiate between human problems and needs.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Define decision-making, research and invention.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Discuss how technological systems have been used to solve human problems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Select and apply a general problem-solving model in a laboratory setting.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify research methods, materials and techniques.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Apply cooperative tech-niques while engaged in group problem-solving activities.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Engage in an activity that requires creativity.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe and apply the processes used to make decisions.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Apply appropriate and effective questioning techniques.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Conduct an applied research project.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop, test and modify a design idea through experimentation.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Differentiate between invention and innovation.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop a solution for a real-life problem.

## TECH ED - Grades 5-8 - Leadership

Students will identify and develop leadership attributes and apply them in team situations.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Create a simple flowchart of their daily activities.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Engage in presentation activities.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify the elements of interpersonal communication.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify and demonstrate organizational skills.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore different roles while working cooperatively and effectively in team situations.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Demonstrate strategies for effectively managing time.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop organizational skills through practical experiences.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore different roles within a team environment.

## TECH ED - Grades 5-8 - Materials and Processes

Students will know the origins, properties and processing techniques associated with the material building blocks of technology.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify and describe a group of new and recycled materials used in technological systems.
✓	✓	✓	✓	✓								Differentiate between primary and secondary raw materials.
												Explore methods used to convert raw and recycled materials into usable products.
												Demonstrate the appropriate selection and safe operation of basic hand and power tools.
✓	✓	✓	✓	✓					✓			Use manual and electronic measuring devices accurately.
												Explore the principles of manual material-processing techniques.
												Describe how products are manufactured.
												Demonstrate a working knowledge of the layout, shaping, smoothing, assembly and finishing techniques used to produce a product.
												Explore the principles of computer-controlled processing techniques.
												Produce simple products from a variety of materials, using manual and computer controlled devices.

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## TECH ED - Grades 5-8 - Communication Systems

Students will understand and be able to effectively apply physical, graphic and electronic communications techniques in processing, transmitting, receiving and organizing information.

✓	✓	✓	✓	✓	✓	✓	✓					Identify and give examples of integrated technologies.
												Identify the elements of interpersonal communication.
												Identify the elements of mass communications.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Acquire technology based information and apply it in classroom and laboratory situations.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore and explain the integration of communication technologies into transportation and production systems.
✓	✓											Apply techniques of interpersonal and mass communication through activities such as sketching, CAD, photography, and video.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Evaluate and select appropriate methods of communication for a given problem or situation.

## TECH ED - Grades 5-8 Production Systems

Students will understand and be able to demonstrate the methods involved in turning raw materials into usable products.

✓	✓	✓	✓									Define manufacturing terminology, including interchange ability, automation, standardization, etc.
												Describe how products are manufactured using the methods of single craftsman, line and mass, and automated-robotics manufacturing.
✓	✓	✓	✓	✓								Identify and describe the tools and methods used in manufacturing products.
												Identify the characteristics of sub- and superstructures.
✓	✓											Identify and describe the tools, materials, and methods used in constructing sub- and superstructures.
✓	✓	✓	✓									Design, construct and test models of shelters and other structures.
												Produce a product using a simple production sequence: layout, shaping, smoothing, assembly, and finishing techniques.

## TECH ED - Grades 5-8 - Transportation Systems

Students will understand transportation systems and the environments used to move goods and people, and the subsystems common to each.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Differentiate between vehicular and stationary transportation systems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Differentiate between fixed and random-route land transportation systems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe and be able to identify the trans. subsystems of body/frame, propulsion, suspension, control, guidance and support in a variety of transportation devices.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore the characteristics of lighter than air and heavier than air atmospheric transportation systems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Apply the concept of transportation subsystems while solving transportation problems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify and experiment with devices used to protect product and personnel in transportation systems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore, build and experiment with model marine, space, land and airportation systems.

## TECH ED - Grades 5-8 - Enterprise

Students will demonstrate the techniques of enterprise and how they relate to product and service production, economics, human and material resources, and technology.

											✓	Describe the evolution of technological enterprise.
											✓	Discuss the influence of enterprise on culture, society, and the environment.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Define the terms single ownership, company, corporation, and partnership.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore the career possibilities and responsibilities in enterprise.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify and explore a variety of organizational structures, describing the advantages and disadvantages of each
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore market research and its relationship to satisfying consumer needs.
												Develop, distribute and evaluate a customer survey.

## TECH ED - Grades 5-8 - Engineering Design

Students will be able to apply the engineering design process to achieve desired outcomes across all technology content areas.

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Identify the elements of design.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Discuss the differences between problem solving and engineering design strategies.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explain the role of creativity in the engineering design process.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Describe conceptual design, embodiment design, and detail design and identify their roles in the engineering process.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore a variety of creativity-enhancing techniques.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop conceptual designs for transportation, communications, production and bio-related problems.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Use a variety of creativity-enhancing techniques in conceptual design situations.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Explore techniques used to refine conceptual design sketches.
✓	✓		✓									Develop preliminary product layouts.