

COMPUTATIONAL THINKING VOCABULARY AND PROGRESSION CHART - Resources found at iste.org/CT

	<u>Definition</u>	<u>Grades PK-2</u>	<u>Grades 3-5</u>	<u>Grades 6-8</u>	<u>Grades 9-12</u>
Data Collection	The process of gathering appropriate information	Conduct an experiment to find the fastest toy car down an incline and record car order across finish line in a chart	Review examples of writing to identify strategies for writing an essay.	Design survey questions to gather appropriate information to answer questions	Students develop a survey and collect both qualitative and quantitative data to answer the question: "Has global warming changed the quality of life?"
Data Analysis	Making sense of data, finding patterns, and drawing conclusions	Make generalizations about the order of finishing a toy car race based on weight of car; test conclusion by adding weight to change results	Categorize strong and weak examples of writing samples to develop a rubric.	Produce and evaluate charts from data generated by a digital probe and describe trends, patterns, variations represented in the chart	Use appropriate statistical methods that will best test the hypothesis: "Global warming has not changed the quality of life."
Data Representation	Depicting and organizing data in appropriate graphs, charts words, or images	Create a chart or a line drawing than shows how the speed of a toy car changes went its weight is changed	Match each writing sample to the rubric and create a chart showing which example best fits in each category of the rubric.	Plot data using different charting formats and select the most effective visual representation strategy	Groups of students represent the same data in different ways based on a position relating to the question: "Has global warming changed the quality of life?" Different representations may result in varying conclusions
Problem Decomposition	Breaking down takes into smaller, manageable parts	Create directions to a location in the school by breaking the directions down into smaller geographical zones; Join the sections of directions together into a whole	Develop a plan to make the school "green." Separate strategies such as recycling paper and cans, reducing use of electricity and paper, and composting food waste.	In planning the publication of a monthly newsletter, identify roles, responsibilities, timeline, and resources needed to complete the project	Consider the large-scale problem: "What does it take to become a rock star?" Break it into smaller parts. Discuss what variables are within a student's control and what variables are determined by outside factors
Abstraction	Reducing complexity to define main idea	With many sized and colors of 3-sided shapes, the abstract is a triangle	Hear a story, reflect on main items, and determine an appropriate title	After studying a period in history, identify symbols, themes, events, key people, and values that are most representative of the time period (e.g. coat of arms)	Choose a period in politics that was most like the current one by analyzing the essential characteristics of the current period

Algorithms & Procedures	Series of ordered steps taken to solve a problem or achieve some end	Create a set of directions from the school to the major landmarks in the neighborhood. <i>Can use maze puzzles.</i>	Design a board game and write instructions to play. Test instructions on peers trying to play the game. Refine instructions with feedback from peers who played the game. <i>Can also use cards and dice, conditional code.org unplugged lesson.</i>	Program a robot to find its way out of a maze such that given any maze, the robot could exit successfully within a specified time period	Discuss the decision-making process for choosing a college, then create an algorithm that describes that process. The algorithm will be able to handle unknown variables, such as where friends are attending, availability of financial aid, and admission success, to come to an unambiguous decision.
Automation	Having computers or machines do repetitive or tedious tasks	Converse with a classroom in another state or country to learn about their culture using Internet-based tools to replace writing letters	Investigate what automation is through real-world examples like barcodes, teller machines, and library scanner.	Program a sensor to collect pollution data (set timers with probes) and then use a computer program to sort the readings from maximum to minimum CO2 levels	Debate the merits of learning skills and information that are rarely necessary today because of automation. These skills might include long division, deriving square roots, spelling, statistical formulas, memorizing historic dates, etc.
Simulation	Representation or model of a process; simulation also involves running experiments using models	After a set of directions has been created, act out the steps to be sure they are correct. <i>Can do this with Code.org Maze Puzzles.</i>	Create an animation to demonstrate the understanding of a process. <i>Can use the Artist and Play lab in Code.org.</i>	Use a model of a simple ecosystem to conduct experiments that answer what happens to the ecosystem if some percentage of the producers die. The user controls the % that dies off	Create a spreadsheet to simulate the "Birthday Problem" (How many people must be in a room for there to be at least a 50% chance that at least two have the same birthday?) Use the same model to answer the question for 3 people having the same birthday.
Parallelization	Organize resources to simultaneously carry out tasks to reach a common goal	Based on a set of criteria, break the class into 2 groups. Have one group read aloud while the other group provides humming background music. The goal is reached, but the whole is better than the parts.	Teachers facilitate in planning tea project timelines, roles, and assignments and working together to complete components (how do we break up the tasks, what tasks have to be done sequentially and others simultaneously, check ins, meeting deadlines?)	Student teams plan production of a video, including script, props, and roles of the team. Identify tasks that will be carried out simultaneously, and milestones where they check in, and plan, and put things together	Describe the sequence of activities by each of the armies leading to the battle of Waterloo. Include both physical activities (e.g. recruit troops) and intellectual activities (e.g. pick troop positions)