



# Intro to Computer Science - Unit 4 - Functions and Subroutines

## Unit Focus

In this unit, students will learn how we can break large tasks into smaller, reusable units of work called subroutines and functions. Students will learn the value of subroutines and functions, how to write them, and how to pass arguments to them. Students will continue exploring how to use built-in functions to efficiently code solutions to problems.

## Stage 1: Desired Results - Key Understandings

| Standard(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Transfer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                  |
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| <b>Common Core</b><br>Mathematics: 9-12 <ul style="list-style-type: none"><li>Use appropriate tools strategically. (CCSS.MATH.MP.5)</li><li>Look for and make use of structure. (CCSS.MATH.MP.7)</li></ul><br><b>Madison Public Schools Profile of a Graduate</b> <ul style="list-style-type: none"><li>Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)</li><li>Idea Generation: Studying a problem, need or model (mentor text, political piece, documents, art work, etc.) to consider limitations and imagine new solutions/transformations. (POG. 2.1)</li></ul> | <i>Students will be able to independently use their learning to...</i><br><b>T1</b> use appropriate tools to make reaching solutions more efficient, accessible and accurate.<br><b>T2</b> apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem.                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Meaning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Understanding(s)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Essential Question(s)</b>                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <i>Students will understand that...</i><br><b>U1</b> Computer Scientists examine relationships to discern a pattern, generalizations, or structure.<br><b>U2</b> Computer Scientists can describe patterns, relations, and/or functions to access strategies to solve problems.                                                                                                                                                                                                                              | <i>Students will keep considering...</i><br><b>Q1</b> How can I break a problem down into manageable parts?<br><b>Q2</b> What math tools/models/ strategies can I use to solve the problem?                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Acquisition of Knowledge and Skill</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Knowledge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Skill(s)</b>                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <i>Students will know...</i><br><b>K1</b> why we write subroutines and functions<br><b>K2</b> the difference between "pass by value" and "pass by reference"<br><b>K3</b> how to return a value from a function<br><b>K4</b> how to create a function library<br><b>K5</b> how to use a function that exists in a function library<br><b>K6</b> how to use recursion in a function<br><b>K7</b> Vocabulary: function, subroutine, argument, parameter, call by value, call by reference, recursion, overload | <i>Students will be skilled at...</i><br><b>S1</b> writing a subroutine or function definition<br><b>S2</b> passing arguments to a subroutine or function<br><b>S3</b> writing a subroutine or function body<br><b>S4</b> nesting function calls<br><b>S5</b> calling a function |