# DIGITAL TECHNOLOGIES: DESIGN A SOFTWARE PROGRAM STRUCTURE

Design a software program focuses on designing the structure of a software programs. Initially students learn to specify variables and their data types, construct flexible and robust plans, and determine structures that combine well-chosen actions, conditions and control structures that provide well-structured logical solution to tasks. They establish sets of test cases with expected, boundary and invalid input for testing programs. Students progress to designing the structure of a complex software program where the plan has a modular structure, an indexed data structure, input and output, and procedural structures that combine sequential, conditional, and iterative structures. By level 8 students should be using an Integrated Development Environment (IDE) to develop code following a disciplined development process with cycles of incremental development and testing.

| | LEVEL 6 | LEVEL 7 | LEVEL 8 |
|---|---|---|---|
| LO | *Demonstrate ability to design the structure of a basic software program* | *Demonstrate ability to design the structure of an advanced software program* | |
| TEACHER GUIDANCE | To support students to develop an ability to design the structure of a basic software program at level 6, teachers could:<br>• Guide students on how to specify variables and their data types.<br>• Guide students to independently construct flexible and robust plans for basic programs that include using actions, conditions and control structures such as: checking input data for validity; correctly handling expected, boundary and invalid inputs; and using constants, variables and derived values in place of literals.<br>• Guide students to set out program codes clearly and to document programs with comments.<br>• Guide students on how to specify procedural structures that combine well-chosen actions, conditions and control structures that constitute well-structured logical solution to tasks which have no unnecessary duplication or repetition.<br>• Guide students specify comprehensive sets of test cases with expected, boundary and invalid input for testing programs. | To support students to develop an ability to design the structure of an advanced software program at level 7, teachers could:<br>• Guide students on how to specify well-chosen scopes for variables, their scopes and data types<br>• Guide students on how to specify indexed data structures<br>• Guide students on how to specify modular structures for programs with well-chosen parameters, including details of procedural structures of modules, that constitute well-structured logical decomposition of tasks<br>• Guide students on how to specify a comprehensive set of expected, boundary and exceptional input cases for testing programs.<br>• Guide students on how to specify variables, constants, and derived values effectively so as to maximise the flexibility and robustness of independently constructed plans | **LEARNING OBJECTIVE PROGRESSES TO:**<br>*Develop a complex computer program for a specified task*<br>***S*ee next page** |
| INDICATORS | Students can:<br>• specify variables and their data types<br>• independently construct a flexible and robust plan<br>• specify a procedural structure that combines well-chosen actions, conditions and control structures that constitutes a well-structured logical solution to the task<br>• specify a comprehensive set of test cases with expected, boundary and invalid input for testing the program. | Students can:<br>• specify well-chosen scopes for variables, their scopes and data types<br>• specify an indexed data structure<br>• specify a modular structure for the program with well-chosen parameters, including details of the procedural structures of the modules, that constitute a well-structured logical decomposition of the task<br>• specify a comprehensive set of expected, boundary and exceptional input cases for testing the program.<br>• specify variables, constants, and derived values effectively so as to maximise the flexibility and robustness of an independently constructed plan. | |
| AS | **AS91075 Digital Technologies 1.45**<br>*Construct a plan for a basic computer program for a specified task* | **AS91372 Digital Technologies 2.45**<br>*Construct a plan for an advanced computer program for a specified task* | **AS91637 Digital Technologies 3.46**<br>*Develop a complex computer program for a specified task* |
| | Level 1 Digital Technologies standards | Level 2 Digital Technologies standards & assessment | Level 3 Technology achievement standards & assessment resources DRAFT |