# Software Engineering Stage 6 (Year 11) – sample assessment task 1 notification

**Programming fundamentals**



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## Task description

**Type of task:** create and document educational software created in a high-level general-purpose programming language.

**Outcomes being assessed:**

A student:

* describes methods used to plan, develop and engineer software solutions **SE-11-01**
* explains how structural elements are used to develop programming code **SE-11-02**
* applies tools and resources to design, develop, manage and evaluate software **SE-11-06**
* implements safe and secure programming solutions **SE-11-07**

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**Suggested weighting: 25%**

You are to design, code and document a software solution for an educational product. The software is to be developed in a high-level general-purpose programming language.

The educational piece of software is to be an interactive solution. The software could be designed for either primary or secondary students. It will include an intuitive command line interface that displays directions and responses to the user’s requests.

## Submission details

The format of the task submission should be one document highlighting documentation and uploading the piece of educational software designed.

Students should be fully aware of the School Assessment Procedures for their year group.

## Steps to success

Table 1 – assessment preparation schedule

|  |  |
| --- | --- |
| Steps | What I need to do |
| Software DevelopmentExplore the fundamental development steps in relation to their project. | Write a requirements definition for the given real-world problem.Identify the user specifications for the chosen software solution. |
| Designing Algorithms | Develop a structured algorithm using pseudocode or flowcharts including the use of subprograms and passing parameters.Algorithms should include sequence, selection, iteration and subprograms, and be described using a structure chart. |
| Data for Software Engineering | Define and discuss the use of the following data types. Select a minimum of 3 to use in your project:* char and string
* Boolean
* real
* single precision floating point
* integer
* date and time.

Create a data dictionary for use with your project.Define and discuss the use of the following data structures. Select a minimum of 2 to use in your project:* arrays
* records
* trees
* sequential files.
 |
| Developing Solutions with Code | Convert your algorithm into code using:* control structures
* data structures
* standard modules
* subprograms (including parameter passing).

Define and discuss the following debugging tools used in your project:* breakpoints
* single line stepping
* watches
* interfaces between functions
* debugging output statements.

Document and implement at least one appropriate data structure that supports data storage.Describe the errors you experienced in the coding of your solution including:* syntax
* logic
* runtime.
 |

## What is the teacher looking for?

This task will require students to choose a section of the curriculum associated with either primary or secondary students. For example, the software could help students learn their times table, recognise types of triangles or learn a new language. Students design, develop and document a software solution coded in a high-level general-purpose programming language that assists students in learning their chosen content area.

## Marking guidelines

Table 2 – assessment marking guidelines

|  |  |
| --- | --- |
| Grade | Marking guideline descriptors |
| A | * Demonstrates an extensive understanding of the steps used by programmers when designing software.
* Develops highly effective algorithms to demonstrate the logic required for a software solution.
* Develops highly effective computing solutions using the python programming language.
 |
| B | * Demonstrates a thorough understanding of the steps used by programmers when designing software.
* Develops effective algorithms to demonstrate the logic required for a software solution.
* Develops effective computing solutions using the python programming language.
 |
| C | * Demonstrates a sound understanding of the steps used by programmers when designing software.
* Develops sound algorithms to demonstrate the logic required for a software solution.
* Develops sound computing solutions using the python programming language.
 |
| D | * Demonstrates a basic understanding of the steps used by programmers when designing software.
* Develops basic algorithms to demonstrate the logic required for a software solution.
* Develops basic computing solutions using the python programming language.
 |
| E | * Identifies the requirements for the documentation and production of a software solution.
 |

The [Common grade scale for preliminary courses](https://www.educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Understanding-the-curriculum/awarding-grades/monitoring-grades/common-grade-scale/%21ut/p/z1/xVPLcoIwFP0WFywzuQkIuMQ-pD6qbaVKNk6MQbESEIK2_fqibWe6Udpx0ezu85yTnGCGp5gpvouXXMep4psqDpk9s-58ABNovzP2bfDaDx2_6wM1LRtPjg3UIzbxLdIbdlwC3nhIbNp16DBoYnaYJ7RDiEsH4FAHvMfR1ejav6XQb37Nw4njwe_mzzSw8_yfMcNMKJ3pFQ6z_UykSkulDcjydC2FRns5N0DJghtACCLUgFItZF5orhaxWiK9kkiUeR6LclMmBvA9z4-FZc4XsjAgSVWs0_xnSqRJlf0MUSH4Rh5YZCJe4JDTCFpgz5HbciSyWlETtWyToqhpujIiwrVd-a36tCx2_lInB7yad6vbEVYcnJMcehae7GK5x4FK86Ry0tMfJfq1CORChJr1zoXru3XWq_5WvN5umVcZ8OC6V42n_-jALAmCIHHNN_QSDW5MK-zu3tv3iIVeo_EBWSUHjA%21%21/dz/d5/L2dBISEvZ0FBIS9nQSEh/?urile=wcm%3Apath%3A%2Fpw_content%2Fproject-web%2Fnesa%2F11-12%2FUnderstanding-the-curriculum%2Fawarding-grades%2Fmonitoring-grades%2Fcommon-grade-scale) should be used to report student achievement.

## Student-facing rubric

Table 3 – student facing assessment rubric

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Criteria | Limited | Basic | Sound | High | Outstanding |
| Criteria 1Explore the fundamental development steps in relation to their project | Student labels the fundamental development steps in a project. | Student identifies the fundamental development steps in their project. | Student outlines and refers to the fundamental development steps in their project. | Student explains and applies fundamental development steps to their project. | Student comprehensively explains and applies the fundamental development steps to their project. |
| Criteria 2Designing algorithms | Student identifies the control structures in an algorithm. | Student develops an algorithm which makes some use of the control structures. | Student develops a correct algorithm that correctly uses all of the control structures including sequence, selection, repetition and subprograms. | Student develops a correct algorithm detailing the steps required for a solution to their problem. The algorithm makes the correct use of all the control structures including sequence, selection, repetition and subprograms. | Student designs, develops and desk checks structured algorithms documenting the steps required for a solution to their problem. The algorithm makes the correct use of all the control structures including sequence, selection, repetition and subprograms. |
| Criteria 3Data for software engineering | Student labels data types used in coding.Student identifies a Data Dictionary. Student identifies the data structures used in coding. | Student defines the data types used in their project.Student fills in an incomplete Data Dictionary.Student defines the data structures used in coding. | Student discusses the data types used in their project.Student creates a Data Dictionary for their project.Student defines the data structures used in their project. | Student explains the use of data types used in their project.Student creates a correct Data Dictionary for use with their project.Student explains the data structures and discusses their use in their project. | Student justifies their selection of data types used in their project.Student creates a comprehensive Data Dictionary for use with their project.Student justifies the data structures selected for their project. |
| Criteria 4Developing solutions with code | Student completes missing code to solve a task description.Student documents use of data structures and errors. | Student modifies code to solve the task description.The code includes some use of the control structures, some use of data structures and parameter passing.Student identifies their use of at least one software debugging tool.Student correctly describes at least one error experienced in the coding of their solution. | Student creates code to solve the task description.Their code includes some use of the control structures, some use of data structures and parameter passing.Student defines and documents their use of at least one software debugging tool and describes at least one error experienced in the coding of their solution. | Student creates and documents code to solve the task description. Their code includes correct use of most of the control structures, effective use of data structures and parameter passing.Student defines and documents their use of a range of software debugging tools.Student correctly describes a range of errors experienced in the coding of their solution. | Student creates, documents and explains efficient code to solve the task description. Their code includes correct use of all the control structures, effective use of data structures and parameter passing.Student correctly uses, defines and documents in detail a range of software debugging tools.Student correctly describes in detail a range of errors experienced in the coding of their solution and how they were corrected. |

## Student support material

Resources include:

* Teacher resource for Programming Fundamentals
	+ This resource provides a guided walkthrough of an educational software project.
* [Software Engineering Syllabus](https://curriculum.nsw.edu.au/syllabuses/software-engineering-11-12-2022)
* [Software Engineering Course Specifications](https://library.curriculum.nsw.edu.au/341419dc-8ec2-0289-7225-6db7f2d751ef/94e1eb0a-0df7-4dbe-9b72-5d5e0d17143a/software-engineering-11-12-higher-school-certificate-course-specifications.PDF)
* [Software Engineering Glossary](https://curriculum.nsw.edu.au/syllabuses/software-engineering-11-12-2022?tab=glossary)

## Additional information

This resource has been developed to assist teachers in NSW Department of Education schools to create learning that is contextualised to their classroom. It can be used as a basis for the teacher’s own program, assessment, or scope and sequence, or be used as an example of how the new curriculum could be implemented. The resource should be used with time frames that are created by the teacher to meet the overall schedules of assessment.

For additional support or advice, contact the TAS (Technology & Applied Studies) curriculum team by emailing TAS@det.nsw.edu.au.

### Assessment advice

Assessment is a powerful tool to measure student learning and plan for the next stages in the learning process. Some considerations in using parts of this assessment notification are:

* Consider the skills, knowledge and understanding students need to complete the task, and see where there are opportunities for them to refine these through ongoing feedback in the learning sequences associated with the assessment task.
* Ensure the language and readability of the task presents an appropriate challenge for the students the task is being used with. Direct, plain English will allow the greatest number of students to access the task independently.
* Marking guidelines should directly reflect the success criteria and outcomes of the task and align with appropriate levels of achievement for the relevant Stage.
* When constructing or adjusting the marking guidelines and/or rubric, try to keep active verbs like ‘do’, ‘say’, ‘make’ or ‘write’ in mind to measure student performance at each level. This will help to avoid subjective language.

### Assessment as a learning opportunity

Assessment can provide ways for students to use formal and informal feedback and self-assessment to help them understand where they are in their learning, where they are going, and how they are going to get there. It is essential that students receive feedback on their performance in the task and have opportunity to clarify and plan the next steps in learning.

* Clear and explicit marking rubrics can support effective self-assessment in relation to the learning intentions and success criteria assisting students to become owners of their own learning. Students can then build their capacity for individual goal setting, which includes students asking questions such as, ‘What do I need to improve?’ and ‘What is my next step?’ ([CESE (Centre for Education Statistics and Evaluation) Growth goal setting – what works best in practice](https://education.nsw.gov.au/about-us/educational-data/cese/publications/practical-guides-for-educators/growth-goal-setting)).
* Greater learning gains may be made when teachers provide explicit descriptive feedback to students in a timely manner. This feedback supports students in forming their learning goals as well as helping the teacher to plan for the next iteration of the teaching and learning cycle.

### Differentiation advice

Differentiated learning can be enabled by differentiating the assessment approach to content, process and product. Reasonable adjustments of assessment for students with disability is a legal requirement under the [Disability Standards for Education 2005 (Cth)](https://www.dese.gov.au/disability-standards-education-2005). For students with a disability, adjustment in assessment tasks should be made through the [Collaborative curriculum planning](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/diversity-in-learning/special-education/collaborative-curriculum-planning) process. For more information on differentiation, go to [Differentiating learning](https://education.nsw.gov.au/teaching-and-learning/professional-learning/teacher-quality-and-accreditation/strong-start-great-teachers/refining-practice/differentiating-learning) and [Differentiation](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/primary-school/teaching-strategies/differentiation). When using this resource, teachers can use a range of [adjustments](https://education.nsw.gov.au/teaching-and-learning/disability-learning-and-support/personalised-support-for-learning/adjustments-to-teaching-and-learning) to ensure a personalised approach to student learning.

* Some common adjustments are available through the [inclusive practice hub assessment and reporting](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/all-resources/secondary-resources/other-pdf-resources/nesa-assessment-and-reporting) site.
* The [Universal Design for Learning planning tool](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/universal-design-for-learning) can be used to support the diverse learning needs of students using inclusive teaching and learning strategies.
* The [HPGE (High Potential and Gifted Education) Differentiation Adjustment Tool](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/implement/differentiation-adjustment-strategies) and [Differentiation Package](https://schoolsnsw.sharepoint.com/sites/HPGEHub/SitePages/Home.aspx#first-time-access-to-hpge-resources) can assist teachers to decide how to provide extension and additional challenge for High Potential and Gifted (HPG) students.

The steps below may be useful to consider when creating access opportunities for all students:

* remove unnecessary words or images
* simplify any tricky words, or make a glossary of subject specific words
* reduce the lexical density of the steps and use student-friendly language
* chunk large passages of reading or offer alternate ways of representing the information, such as a visual
* make the task description a checklist with numbered steps
* limit options and/or reduce the number of choices students need to make independently.

### Support and alignment

**Resource evaluation and support**: all curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance and effectiveness. For additional support or advice contact the TAS (Technology & Applied Studies) curriculum team by emailing TAS@det.nsw.edu.au.

**Alignment to system priorities and/or needs:** [School Excellence Policy](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468), [School Success Model.](https://education.nsw.gov.au/public-schools/school-success-model/school-success-model-explained)

**Alignment to the School Excellence Framework**: this resource supports the [School Excellence Framework](https://education.nsw.gov.au/teaching-and-learning/school-excellence-and-accountability/sef-evidence-guide/resources/about-sef) element of assessment (formative assessment, summative assessment, student engagement).

**Alignment to Australian Professional Teaching Standards**: this resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 5.1.2, 5.4.2.

**Consulted with**: Curriculum and Reform and subject matter experts

**NSW Syllabus**: Software Engineering 11–12

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**Resource**: assessment task notification

**Related resources**: further resources to support Software Engineering 11–12 can be found on the [TAS curriculum page](https://education.nsw.gov.au/teaching-and-learning/curriculum/tas).

**Professional learning**: relevant professional learning is available through [HSC Professional Learning](https://education.nsw.gov.au/teaching-and-learning/professional-learning/hsc-pl) or on the [TAS curriculum page](https://education.nsw.gov.au/teaching-and-learning/curriculum/tas).

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