# Computing Technology Stage 5 (Year 9) – sample assessment task 4 notification



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## Task description

**Type of task:** Mechatronic and/or automated system model and documentation.

**Outcomes being assessed:**

* applies iterative processes to define problems and plan, design, develop and evaluate computing solutions **C5-DPM-01**
* manages, documents and explains individual and collaborative work practices **CT5-COL-01**
* designs, produces and evaluates algorithms and implements them in a general-purpose and/or object-oriented programming language **CT5-OPL-01**
* applies computational, design and systems thinking to the development of computing solutions **CT5-THI-01**

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**Suggested weighting: 30%**

In pairs or a small group, you are to create, record development and evaluate a mechatronic and/or automated system model.

Build a mechatronic and/or automated system model. Your task will include:

* creating a preferred design through an iterative approach
* coding the model to work, which will also require iteration
* filming the model perform as part of record development
* recording all development of the model and applying test criteria
* evaluating your model using predetermined functional and non-functional requirements.

## Submission details

Students can submit their work digitally including their project documentation and video.

Students can present and showcase their work in class for peer and teacher review.

## Steps to success

Table 1 – assessment preparation schedule

|  |  |
| --- | --- |
| Steps | What I need to do/when I need to do it |
| Record all steps of development in creating the model | * Create an extensive record of project development that accurately illustrates the iterative journey of completing the building, coding and problem solving when creating the modelled system.
* The record contains detailed and accurate lesson-by-lesson accounts of work completed which includes, discussions, evaluations, images and milestones precisely timestamped and presented in a professional manner.
 |
| Build a mechatronic and/or automated system model | * Build a reliable model that demonstrates excellent problem solving and computational, design and systems thinking.
* Ensure the model contains working control systems, components, microcontrollers, co-processors, sensors, effectors and manipulators, and demonstrates motion.
 |
| Code the model to complete the chosen function | * Demonstrate an understanding of programming logic and programming language syntax to develop a highly effective, reliable and efficient solution.
 |
| Enhance the models function by coding the model to function demonstrating efficiency  | * Apply problem-solving skills to code a solution that follows a logical structure, using the correct syntax, contains an accurate and reliable algorithm which is free of syntax and logic errors.
* Ensure the code is highly readable and efficient, and solves all components identified in the mechatronic and/or automated system.
 |
| Use video to film the model operating | * Compile and present a well organised and sequenced video that details their iterative approach. The video extensively and accurately illustrates the testing, programming, failures, successes and evaluation of the system.
 |
| Evaluate the model using functional and non-functional requirements and test criteria  | * Evaluation and test criteria for components of the automated and/or mechatronic system is developed. It details the objective and explains areas of success and improvement based on predetermined functional and non-functional requirements.
 |

## What is the teacher looking for?

Students are to manage, document and explain individual and collaborative work practices as they document the development of the system model. The record of development contains detailed and accurate lesson-by-lesson accounts of work completed which includes discussions, evaluations, images and milestones

This task will require students to correctly build and code a mechatronic and/or automated system. This chosen system will require problem solving and iteration in computational, design and systems thinking.

Understanding how the system will computationally work is developed in the prior assessment where the student represents the system in algorithms such as flowcharts and pseudocode. This task focuses on coding the model and enhancing the design and function as it is in development.

Evaluation of the final model and code will see students test the model of the system through developing test criteria and analysis using functional and non-functional requirements.

## Marking guidelines

Table 2 – assessment marking guidelines

|  |  |
| --- | --- |
| Grade | Marking guideline descriptors |
| A | * The student skilfully applies appropriate iterative processes to produce computing solutions
* The student develops highly effective computing solutions using computational, design and systems thinking skills
* The student skilfully develops, tests and implements technically concise algorithms in a general-purpose programming language
* The student selects relevant data, media and processes to effectively communicate information in a range of contexts
 |
| B | * The student applies appropriate iterative processes to produce computing solutions
* The student develops effective computing solutions using computational, design and systems thinking skills
* The student develops, tests and implements functional algorithms in a general-purpose programming language
* The student selects relevant data, media and processes to communicate appropriate information in a range of contexts
 |
| C | * The student applies iterative processes to produce computing solutions
* The student develops sound computing solutions using computational, design and systems thinking skills
* The student develops common algorithms and implements them in a general-purpose programming language
* The student selects appropriate data, media and processes to communicate information in a range of contexts
 |
| D | * The student uses processes to produce computing solutions
* The student develops basic computing solutions using computational or design or systems thinking skills
* The student develops basic algorithms and/or implements them in a general-purpose programming language
* The student uses data to communicate basic information
 |
| E | * The student identifies processes that may produce a computing solution
* The student follows algorithms and/or partially implements them in a general-purpose programming language
* The student uses data to communicate information in a very limited way
 |

## Student-facing rubric

Table 3 – rubric for assessment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Criteria | Limited | Basic | Sound | High | Outstanding |
| Criteria 1Record of project development | Students incorrectly record the journey of completing and modelling a system. The record is limited and incomplete and is presented inappropriately. | Students provide a basic record of project development that inaccurately illustrates the journey of completing the system. The record contains incomplete lesson-by-lesson accounts of work completed. | Students provide a record of project development that correctly illustrates the journey of completing the modelled system. The record contains lesson-by-lesson accounts of work completed which includes, discussions, evaluations, images and milestones precisely timestamped and is presented appropriately. | Students provide an accurate record of project development that correctly illustrates the journey of completing the modelled system. The record contains detailed lesson-by-lesson accounts of work completed which includes, discussions, evaluations, images and milestones precisely timestamped and is presented in a professional manner. | Students provide an extensive record of project development that accurately illustrates the journey of completing the modelled system. The record contains detailed and accurate lesson-by-lesson accounts of work completed which includes, discussions, evaluations, images and milestones precisely timestamped and is presented in a professional manner. |
| Criteria 2Model systems | Students build an incomplete model. The model does not contain the correct sensors and actuators for its purpose. | Students build an incomplete model. The model contains some control systems, components, microcontrollers, co-processors, sensors, effectors and manipulators. | Students build an appropriate model. The model contains suitable control systems, components, microcontrollers, co-processors, sensors, effectors and manipulators. | Students build an effective and reliable model that demonstrates problem solving and computational, design and systems thinking ability. The model contains appropriate control systems, components, microcontrollers, co-processors, sensors, actuators, effectors and manipulators and demonstrates motion. | Students build an outstanding and reliable model that demonstrates excellent problem solving and computational, design and systems thinking ability. The model contains working control systems, components, microcontrollers, co-processors, sensors, actuators, effectors and manipulators and demonstrates motion. |
| Criteria 3Code | Students demonstrate an elementary understanding of programming logic and programming language syntax. | Students demonstrate some understanding of programming logic and programming language syntax to develop a somewhat effective solution. | Students demonstrate understanding of programming logic and programming language syntax to develop a mostly effective and reliable solution. | Students demonstrate a thorough understanding of programming logic and programming language syntax to develop a mostly effective, reliable and efficient solution. | Students demonstrate an extensive understanding of programming logic and programming language syntax to develop a highly effective, reliable and efficient solution. |
| Criteria 4Problem solve through programming | Students coded solution shows little logical structure with few examples of correct syntax and readable code and does not fully solve components identified in the mechatronic and/or automated system. | Students apply problem-solving skills to code a solution that shows some basic logical structure, using some correct syntax, and solves some components identified in the mechatronic and/or automated system. | Students apply problem-solving skills to code a solution that follows a sound logical structure, using mostly correct syntax, has a sound level of readability, and solves most components identified in the mechatronic and/or automated system. | Students apply thorough problem-solving skills to code a solution that follows a mostly logical structure, using mostly correct syntax, contains an accurate and reliable algorithm which is mostly free of syntax and logic errors, is mostly readable, and solves the majority of the components identified in the mechatronic and/or automated system. | Students apply extensive problem-solving skills to code a solution that follows a logical structure, using the correct syntax, contains an accurate and reliable algorithm which is free of syntax and logic errors, is highly readable and efficient, and solves all components identified in the mechatronic and/or automated system. |
| Criteria 5Video | Students provide an incomplete video that incorrectly illustrates basic testing, programming, failures, successes and evaluation of the system. | Students provide an incomplete video that illustrates basic testing, programming, failures, successes and evaluation of the system. | Students compile and present a well organised and sequenced video. The video illustrates the testing, programming, failures, successes and evaluation of the system. The video is well made and presented. | Students compile and present a well organised and sequenced video demonstrating their iterative approach. The video accurately illustrates the testing, programming, failures, successes and evaluation of the system. The video is professionally made and presented. | Students compile and present a well organised and sequenced video that details their iterative approach. The video extensively and accurately illustrates the testing, programming, failures, successes and evaluation of the system. The video is professionally made and presented including use of titles. |
| Criteria 6Evaluation | Evaluation is incomplete and/or lists some areas of success or for improvement. | Evaluation identifies some areas of success and/or areas for improvement. Test criteria for components of the automated and/or mechatronic system have been identified. | Evaluation outlines areas of success and areas for improvement based on predetermined functional and non-functional requirements. Test criteria for components of the automated and/or mechatronic system are outlined. | Evaluation describes areas of success and areas for improvement based on predetermined functional and non-functional requirements. Descriptive test criteria for components of the automated and/or mechatronic system is used. | Evaluation is detailed, objective and explains areas of success and improvement based on predetermined functional and non-functional requirements. There are extensive test criteria for components of the automated and/or mechatronic system. |

## Student support material

Resources include:

* Teacher resource with scaffolds, templates and graphic organisers for completing the task
* Teacher resource with additional information to support student understanding
* Program of learning.

## 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 timeframes that are created by the teacher to meet the overall schedules of assessment.

For additional support or advice, contact the TAS 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 Growth goals 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 [HPGE 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 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**: Computing Technology 7–10

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**Resource**: Assessment task notification

**Related resources**: further resources to support Computing Technology Stage 5 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 the TAS statewide staffroom.

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## Evidence base

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