VCE Algorithmics (HESS) Administrative information for School-based Assessment in 2024

School-assessed Task

The School-assessed Task (SAT) contributes 20 per cent to the study score.

Teachers will provide to the Victorian Curriculum and Assessment Authority (VCAA) a score against each criterion that represents an assessment of the student’s level of performance for Unit 3 Outcome 3 and Unit 4 Outcomes 1 and 2. The recorded scores must be based on the teacher’s assessment of the student’s performance according to the criteria on pages 8–17. This assessment is subject to the VCAA’s statistical moderation process.

The 2024 VCE Algorithmics (HESS) assessment sheet on page 21 is to be used by teachers to record the Unit 3 and Unit 4 SAT scores. The completed assessment sheet for each student’s SAT must be available on request by the VCAA.

The mandated assessment criteria are published annually on the Algorithmics (HESS) study page of the VCAA website and notification of their publication is given in the February *VCAA Bulletin*.

Details of authentication requirements and administrative arrangements for School Assessed Tasks are published annually in the [*VCE Administrative Handbook 2024*](https://www.vcaa.vic.edu.au/administration/vce-vcal-handbook/Pages/index.aspx).

The Authentication record form on pages 19–20 is to be used to record information for each student and must be made available on request by the VCAA.

The SAT relates to:

* Unit 3 Outcome 3
* Unit 4 Outcome 1
* Unit 4 Outcome 2

Teachers should be aware of the dates for submission of scores into VASS in July and November. These dates are published in the [2024 Important Administrative Dates and Assessment Schedule](file:///E:\2024\VCAA%20Documents\VCE%20Administrative%20information\vcaa.vic.edu.au\pages\schooladmin\admindates\index.aspx), published annually on the VCAA website.

Overview of the School-assessed Task

The table below provides a high-level overview of the recommended sequence of tasks, and their mapping to outcomes, criteria and observations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Description** | **Outcome** | **Observation/ Submission** | **Criterion** |
| **Unit 3** | | | |
| A real-world/applied problem context is provided to students |  |  |  |
| Students specify the problem in precise terms, identifying its salient features and modelling it with ADTs | 3 | 1 | 1 |
| Students design an algorithmic solution to the problem | 3 | 2 | 2 |
| Students communicate their algorithmic solution in pseudocode | 3 | 3 | 3 |
| Students justify their solution | 3 | 4 | 4 |
| Unit 3 Outcome 3 SAT – Part 1 is submitted | | | |
|  | | | |
| **Unit 4** | | | |
| Students determine the time complexity of their initial solution | 1 | 5 | 5 |
| Students explain the consequences of the time complexity of their initial solution | 1 | 6 | 6 |
| Students design an improved data model and algorithm combination | 2 | 7 | 8 |
| Students are assessed on the quality of their improved solution | 2 | 8 | 9 |
| Students determine the time complexity of their improved solution | 1 | 9 | 5 |
| Students compare the suitability of their solutions | 1 and 2 | 10 | 7 and 10 |
| Unit 4 Outcomes 1 and 2 SAT – Parts 2 and 3 are submitted | | | |

Unit 3

Applied algorithms

Outcome 3

On completion of this unit the student should be able to design suitable solutions for real-world problems that require the integration of algorithms and data types, including the communication of solutions and their justification.

Nature of task

The design of a data model and algorithm combination to solve a real-world/applied problem, including:

* a specification of the problem
* a consideration of multiple solution options
* the selection of a suitable, coherent, clear and fit-for-purpose solution

Scope of task

Specification of the problem

Criterion 1 assesses students’ skills in specifying a problem and modelling its key features. Teachers are to provide students with a real-world/applied problem context. The problem should be stated in terms that are sufficiently general to allow for individual students to approach it in different ways. The problem context should lend to the data modelling and algorithm design approaches studied in Unit 3, but also have the potential to benefit from the advanced algorithm design methods studied in Unit 4.

Students are to precisely specify the algorithmic problem, formulated from the real-world/applied problem context. They are to identify salient features of the problem and model them using suitable ADTs. They should describe how features of the problem map to the data model and describe signatures for key operations of the data model. Their data model should be presented as an integrated whole, with clear justification for modelling decisions.

Teachers should approve each student’s intended approach early in the process.

The evidence from this task is observed through Observation 1 and assessed through Criterion 1.

Consideration of multiple solutions options

Criterion 2 assesses students’ skills in the design of an algorithm to solve a real-world/applied problem. Students should consider multiple algorithm design approaches to the problem. This may include exploring various Unit 3 algorithm design patterns and/or combining or modifying Unit 3 course algorithms. Students should discuss the rationale underpinning their algorithm design decisions and explain their solution.

The word range for this task is approximately 600–800 words.

The evidence from this task is observed through Observation 2 and assessed through Criterion 2.

Criterion 3 assesses students’ skills in the communication of an algorithmic solution to a real-world/applied problem. Students are to communicate their algorithmic solution in pseudocode.

The evidence from this task is observed through Observation 3 and assessed through Criterion 3.

Solution selection

Criterion 4 assesses students’ skills in the justification of an algorithmic solution to a real-world/applied problem. The justification of a solution at the end of the Unit 3 component relates to:

* the suitability of the choice of model and algorithm
* the coherence of the integration of the data model and algorithm
* whether it is fit-for-purpose in terms of its meeting of the requirements of the real-world/applied problem context

The word range for this task is approximately 300–500 words.

The evidence from this task is observed through Observation 4 and assessed through Criterion 4.

Students should submit their completed Unit 3 Outcome 3 School-assessed Task work.

Further information to support teachers with the planning, teaching and assessing of the Unit 3 Outcome 3 School-assessed Task can be found in the Support materials on the Algorithmics (HESS) study page.

Issues identified after marking Unit 3 Outcome 3

In order to prevent a negative consequential effect on the second component of the SAT in Unit 4 Outcome 1 and Outcome 2, the teacher may provide the student with a naïve functional solution, such as a brute-force solution, to the Unit 3 Outcome 1 task for the student to analyse. This may occur if Unit 3 Outcome 3 is incomplete or contains significant errors, if students do not have a functioning algorithm to analyse, or if teachers would like to provide one version of a Unit 3 Outcome 3 algorithm for all students to analyse to ensure that all students have an equal opportunity of achieving a high level of performance in Unit 4 Outcome 1 and Outcome 2.

Unit 4

Formal algorithm analysis

Outcome 1

On completion of this unit the student should be able to establish the efficiency of simple algorithms and explain soft limits of computability.

Advanced algorithm design

Outcome 2

On completion of this unit the student should be able to solve a variety of information problems using algorithm design patterns and explain how heuristics can address the intractability of problems.

Nature of task

A formal time complexity analysis of the designed algorithm for the applied problem and an explanation of the consequences of these results on the algorithm’s real-world application.

**AND**

A design of an improved data model and algorithm combination to solve the applied problem, including:

* the selection of an efficient, coherent and fit-for-purpose solution
* a time complexity analysis
* a comparison to the original solution.

Scope of tasks

Formal analysis

Criterion 5 assesses students’ skills in determining the time complexity of algorithms. Students are to determine the time complexity of the initial algorithmic solution that they developed as part of Unit 3 Outcome 3.

The word range for this task is approximately 100–200 words.

Full working of time complexity calculations should also be included.

The evidence from this task is observed through Observation 5 and assessed through Criterion 5.

Criterion 6 assesses students’ understanding of the consequences of an algorithm’s time complexity on its real-world application. Students are to explain the consequences of their initial algorithmic solution’s time complexity on its real-world application, including a thorough discussion of practical input sizes and its suitability to the problem’s requirements.

The word range for this task is approximately 100–200 words.

The evidence from this task is observed through Observation 6 and assessed through Criterion 6.

Design of an improved solution

Criterion 8 assesses students’ skills in the design of an improved data model and algorithm combination. Students are to apply the knowledge and skills from Unit 4 Outcome 2 to select and design an improved algorithmic solution. This may include combining or modifying Unit 4 course algorithms. Students should discuss the rationale underpinning their data model and algorithm design decisions and precisely describe their designs.

The word range for this task is approximately 200–400 words.

The evidence from this task is observed through Observation 7 and assessed through Criterion 8.

Criterion 9 assesses students’ skills in advanced algorithmic problem-solving. Students are assessed on the quality of their improved designs based on the solution’s coherence, efficiency and fitness for purpose.

The evidence from this task is observed through Observation 8 and assessed through Criterion 9.

Further formal analysis

Criterion 5 assesses students’ skills in determining the time complexity of algorithms. Drawing on their Unit 4 Outcome 1 knowledge and skills, students are to determine the time complexity of the improved algorithm that they designed as part of Unit 4 Outcome 2.

The word range for this task is approximately 100–200 words.

Full working of time complexity calculations should also be included.

The evidence from this task is observed through Observation 9 and assessed through Criterion 5.

Comparison

Criterion 7 assesses students’ skills in the comparison of the time complexities of algorithmic solutions to a real-world/applied problem. Criterion 10 assesses students’ skills in the comparison of algorithmic solutions in terms of their coherence and fitness for purpose. Students draw on Unit 4 Outcomes 1 and 2 to compare the suitability of their developed solutions.

The word range for this task is approximately 400–600 words.

The evidence from this task is observed through Observation 10 and assessed through Criterion 7 and 10.

Students should submit their completed Unit 4 Outcomes 1 and 2 School-assessed Task work.

Further information to support teachers with the planning, teaching and assessing of the Unit 4 Outcomes 1 and 2 School-assessed Task can be found in the Support materials on the Algorithmics (HESS) study page.

Issues identified after marking Unit 4 Outcome 1

If the formal time complexity analysis of the designed algorithm for the applied problem in Unit 4 Outcome 1 is incomplete or contains significant errors, students have the opportunity to make adjustments to their analysis. Teachers can provide feedback on the quality of the analysis but the adjustments must be student initiated, not teacher directed. The modified analysis is not reassessed. However, this opportunity prevents negative consequential effects for the third part of the School-assessed Task in Unit 4 Outcome 2.

Relationships between tasks and criteria

The following performance descriptors are used to assess student achievement on Unit 3 Outcome 3, Unit 4 Outcome 1 and Outcome 2. Teachers assess evidence produced from the tasks against the criteria and performance descriptors to grade achievements.

The criteria identify specific characteristics that are used to judge levels of performance against the outcomes. Performance descriptors describe typical evidence associated with five different levels of performance for a criterion (five levels; 10 marks).

**Note**: this performance descriptor is based on the premise that each column includes all evidence of the columns to the left for each criterion, that is, the conditions are cumulative.

Criteria 1 to 4 relate to Unit 3 Outcome 3.

Criteria 5 to 7 relate to Unit 4 Outcome 1.

Criteria 8 to 10 relate to Unit 4 Outcome 2.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 3 Outcome 3**  **1. Skills in specifying a problem and modelling its key features.** | * Specifies an algorithmic problem. | Insufficient evidence | Identifies some algorithmic aspects of the real-world/applied problem context. | Outlines some aspects of an algorithmic problem relevant to the real-world/applied problem context. | Formulates an algorithmic problem from the real-world/applied problem context. | Explains how the algorithmic problem is formulated from the real-world/applied problem context. | Provides clear and precise specification of the algorithmic problem, suitably formulated from the real-world/applied problem context. |
| * Explains the salient features of the real-world/applied problem. | Lists arbitrarily-selected features of the real-world/applied problem. | Identifies some relevant features of the real-world/applied problem and outlines reasons for their selection. | Describes salient features of the real-world/applied problem and reasons for their selection. | Identifies features of the real-world/applied problem, and by considering their characteristics, chooses a suitable set of features to model. | Identifies a comprehensive range of features of the real-world/applied problem, and by considering their relevant characteristics, selects a suitable set of salient features to model. |
| * Models the problem using ADTs | Makes a limited attempt to model the selected features of the problem using ADTs that may not be suitable. | Models some features of the problem using suitable ADTs. | Models the selected features of the problem using a combination of suitable ADTs.  Outlines how some features of the problem map to the data model. | Models selected features of the problem using a coherent combination of suitable ADTs.  Describes how some features of the problem map to the data model.  Describes signatures for some operations of the data model. | Models selected features of the problem using a coherent and fit-for-purpose combination of suitable ADTs.  Describes how features of the problem map to the data model.  Describes signatures for key operations of the data model. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 3 Outcome 3**  **2. Skills in the design of an algorithm to solve a real-world/applied problem.** | * Considers suitable algorithmic approaches to the problem. | Insufficient evidence | Identifies an algorithm design approach that has some relevance to the problem. | Outlines a few algorithm design approaches that could form the basis of a solution. | Considers relevant characteristics of several algorithm design approaches. | Compares the suitability of some algorithm design approaches to then determine an appropriate approach. | Thoroughly compares the suitability of several algorithm design approaches to then determine the most appropriate approach. |
| * Describes the design of an algorithmic solution to the real-world/applied problem. | Identifies some aspects of an algorithm to solve the real-world/applied problem. | Outlines a simple algorithm to solve the problem. | Describes a non-trivial algorithm that solves some aspects of the specified problem. | Describes an algorithm that solves the specified problem and involves some combinations of algorithms or algorithm design patterns. | Clearly explains an algorithm that solves the specified problem and involves combinations or modifications of algorithms or algorithm design patterns. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 3 Outcome 3**  **3.** **Skills in the communication of an algorithmic solution to a real-world/applied problem.** | * Communicates the algorithmic solution in pseudocode. | Insufficient evidence | Limited elements of the algorithm are expressed in pseudocode.  The pseudocode includes some correct initialisation of variables and data structures. | Elements of the structure of the algorithm are expressed in pseudocode.  The pseudocode includes the correct use of simple iteration and conditional control structures where appropriate. | The algorithm is expressed in pseudocode such that the structure of the design is apparent.  The pseudocode includes the correct use of nested iteration and recursion where appropriate. | The algorithm is expressed in pseudocode that mostly reflects the solution design. Any errors are minor in nature and do not affect the overall structure of the algorithm.  There is some attempt to use functional abstractions. | The algorithm is correctly and precisely expressed in pseudocode, which accurately reflects the solution design.  A modular approach is employed including the use of ADTs and functional abstractions. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 3 Outcome 3**  **4.** **Skills in the justification of an algorithmic solution to a real-world/ applied problem.** | * Justifies a solution to the real-world/applied problem. | Insufficient evidence | Identifies relevant reasons in support of the selection of a solution. | Outlines the rationale for the selection of a chosen solution based on a limited set of merits and limitations. | Justifies the selection of a solution based on its comparative advantages over other approaches. | Justifies the selection of a solution based on arguments relating to its suitability, coherence or fitness for purpose. | Justifies the selection of a solution by clearly demonstrating its suitability, coherence, and fitness for purpose. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 4 Outcome 1**  **5. Skills in determining the time complexity of algorithms.** | * Analyse the time complexity of the initial algorithmic solution. | Insufficient evidence | Identifies the time complexity of some operations within the algorithm. | Identifies the time complexity of some control structures or non-constant-time sequences of operations within the algorithm.  Combines time complexity terms by applying some appropriate logic. | Identifies essential elements of the algorithm that contribute to its time complexity.  Combines time complexity terms by applying appropriate logic. | Analyses the time complexity of a sophisticated algorithm, that involves functional abstraction and/or recursion, by identifying the time complexities of a broad range of pseudocode elements and logically combining these to produce an overall result. | Analyses the time complexity of a sophisticated algorithm, that involves functional abstraction and/or recursion, by identifying the time complexities of a broad range of pseudocode elements and logically combining these to produce a tight upper-bound of the algorithm’s time complexity. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 4 Outcome 1**  **6. Understanding of the consequences of an algorithm’s time complexity on its real-world application.** | * Explains the consequences of an algorithm’s time complexity on its real-world application. | Insufficient evidence | Briefly describes how an algorithm’s running time would grow as its input size increases. | Describes how an algorithm’s running time would grow as its input size increases, based on an understanding of its time complexity. | Explains some consequences of an algorithm’s time complexity on its real-world application, based on how the algorithm’s running time would grow as its input size increases. | Explains the consequences of an algorithm’s time complexity on its real-world application, including a discussion of practical input sizes and its suitability to the problem’s requirements. | Clearly and precisely explains the consequences of an algorithm’s time complexity on its real-world application, including a thorough discussion of practical input sizes and its suitability to the problem’s requirements. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 4 Outcome 1**  **7.** **Skills in the comparison of the time complexities of algorithmic solutions to a real-world/ applied problem.** | * Compares whether the solutions will render the problem tractable and the real-world implications of this. | Insufficient evidence | Identifies some points of comparison between the algorithmic solutions in relation to whether they would render the problem tractable. | Outlines some points of comparison between the algorithmic solutions in relation to whether they would render the problem tractable. | Describes some points of comparison between the algorithmic solutions in relation to whether they would render the problem tractable. | A comparison of whether the solutions would render the problem tractable and a discussion of the relevant implications of this to their potential application to the problem. | A comprehensive comparison of whether the solutions would render the problem tractable and a thorough discussion of the relevant implications of this to their potential application to the problem. |
| * Compares the relative efficiency of the solutions with regard to the constraints of the real-world/applied problem context. |  | Identifies some points of comparison between the algorithmic solutions in terms of their relative efficiency based on their time complexities. | Outlines some points of comparison between the algorithmic solutions in terms of their relative efficiency based on their time complexities and with some consideration of the constraints of the real-world/applied problem. | Describes some advantages and disadvantages of the algorithmic solutions in terms of their relative efficiency based on their time complexities and with consideration of the constraints of the real-world/applied problem. | A well-developed and considered comparison of the relative efficiency of the solutions, with regard to their time complexities and the constraints of the real-world/applied problem. | A precise and comprehensive comparison of the relative efficiency of the solutions, with regard to their time complexities and the constraints of the real-world/applied problem. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 4 Outcome 2**  **8.** **Skills in the design of an improved data model and algorithm combination.** | * Describes the design of an improved algorithmic solution to the real-world/applied problem. | Insufficient evidence | Identifies an algorithm design approach and describes limited aspects of a design for an improved data model and algorithm combination. | Describes an algorithm design approach and specifies the overall structure of a design for an improved data model and algorithm combination. | Designs an improved data model and algorithm combination that considers advanced algorithm design approaches and provides a clear description of the solution. | Designs an improved data model and algorithm combination utilising advanced algorithm design approaches and/or sophisticated combinations or modifications of algorithms.  Clearly describes the solution, communicating the algorithm in pseudocode. | Designs an improved data model and algorithm combination utilising advanced algorithm design approaches and/or innovative combinations or modifications of algorithms.  Succinctly and precisely describes the solution, communicating the algorithm in pseudocode. |
|  |  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 4 Outcome 2**  **9.** **Skills in advanced algorithmic problem-solving.** | * Quality of the improved solution. | Insufficient evidence | The improved solution exhibits limited advantages over the initial solution with regard to its efficiency, coherence or fitness for purpose. | The improved solution exhibits some advantages over the initial solution with regard to its efficiency, coherence or fitness for purpose. | The improved solution exhibits a range of advantages over the initial solution with regard to its efficiency, coherence or fitness for purpose. | The improved solution exhibits many advantages over the initial solution with regard to its efficiency, coherence and fitness for purpose. | The improved solution exhibits considerable advantages over the initial solution with regard to its efficiency, coherence and fitness for purpose. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **VCE Algorithmics (HESS): School-assessed Task 2024** | | | | | | | |
| **Assessment Criteria** | **Levels of Performance** | | | | | | |
| **Indicators** | **Not shown** | **1–2 (very low)** | **3–4 (low)** | **5–6 (medium)** | **7–8 (high)** | **9–10 (very high)** |
| **Unit 4 Outcome 2**  **10.** **Skills in the comparison of algorithmic solutions in terms of their coherence and fitness for purpose.** | * Compares algorithmic solutions in terms of their coherence and fitness for purpose. | Insufficient evidence | Identifies some points of comparison between the algorithmic solutions to the real-world/applied problem. | Outlines some points of comparison between the algorithmic solutions based on their design features or fitness as solutions to the real-world/applied problem. | Describes some points of comparison between the algorithmic solutions based on their design features and fitness as solutions to the real-world/applied problem. | Compares the algorithmic solutions based on their design features, coherence and fitness as solutions to the real-world/applied problem, including the identification of their similarities and differences. | Comprehensively compares the algorithmic solutions based on their design features, coherence and fitness as solutions to the real-world/applied problem, including the thorough identification of their similarities and differences. |
|  | 0 ❑ | 1 ❑ 2 ❑ | 3 ❑ 4 ❑ | 5 ❑ 6 ❑ | 7 ❑ 8 ❑ | 9 ❑ 10 ❑ |

Authentication of VCE Algorithmics (HESS) School-assessed Task (SAT)

Teachers are reminded of the need to comply with the authentication requirements specified in the Assessment: School-based Assessment section of the [*VCE Administrative Handbook 2024*](https://www.vcaa.vic.edu.au/administration/vce-vcal-handbook/Pages/index.aspx). This is important to ensure that ‘undue assistance [is] not … provided to students while undertaking assessment tasks’.

Teachers must be aware of the following requirements for the authentication of VCE Algorithmics (HESS) School-assessed Task.

1. The body of work created for the School-assessed Task (SAT) is based on work developed and completed in Unit 3 Outcome 3 and Unit 4 Outcomes 1 and 2.

2. Teachers are required to fill out the Authentication record forms and provide the student with feedback on their progress at each observation.

3. Undue assistance should not occur at any time during the development of the body of work and teachers need to be vigilant. Students are required to demonstrate development of their thinking and working practices. Teachers are reminded that it is not appropriate to provide ‘detailed advice on, corrections to, or actual reworking of students’ work’.

4. Teachers must sight and monitor the development and documentation of the student’s thinking and working practices throughout the unit to authenticate the work as the student’s own. Students must acknowledge the source of materials and information used to support the development of their work.

5. Students should be encouraged to complete their work at school. Where students use external service providers, their documentation should demonstrate ongoing progress throughout the SAT.

6. During development of the data model and solutions teachers must plan and use observations of student work in order to monitor and record each student’s progress as part of the authentication process. Teachers must ensure that all source and reference material, all use of non-school (home, outsourced) resources and any external assistance (for example, tutors) are acknowledged on the Authentication record form. If a student acknowledges using external resources or receiving external assistance, the teacher should record complete details as an attachment to the Authentication record form.

7. Teachers are reminded that authentication procedures must be followed for all student work in relation to this SAT. The School-based Assessment Audit includes the inspection of Authentication record forms.

Authentication record form: VCE Algorithmics (HESS) 2024

Unit 3 School-assessed Task

This form must be completed by the class teacher. It provides a record of the monitoring of the student’s work in progress for authentication purposes. This form is to be retained by the school and filed.   
It may be collected by the VCAA as part of the School-based Assessment Audit.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |

Student name …………………………………………………………….. Student No

School …………………………………………………………………… Teacher: ……………………………………..…………………………………………….

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component of School-assessed Task** | **Date observed and submitted** | **Teacher comments** | **Teacher’s initials** | **Student’s initials** |
| **Observation 1: Specifying and modelling the problem**  **(Criterion 1) Unit 3 Outcome 3 SAT – Part 1**  The student specifies the problem and models it using ADTs. | Observed | Observation of the problem specification and modelling process. |  |  |
| **Observation 2: Designing an algorithmic solution**  **(Criterion 2) Unit 3 Outcome 3 SAT – Part 1**  The student considers a range of approaches and designs an algorithmic solution to the problem. | Observed | Observation of the design of an algorithmic solution. |  |  |
| **Observation 3: Communicating the algorithmic solution**  **(Criterion 3) Unit 3 Outcome 3 SAT – Part 1**  The student communicates their solution in pseudocode. | Observed | Observation of pseudocode. |  |  |
| **Observation 4: Solution justification**  **(Criterion 4) Unit 3 Outcome 3 SAT – Part 1**  The student justifies the suitability of their solution. | Observed | Observation of the justification of the solution. |  |  |
| **Submission of Unit 3 Outcome 3 School-assessed Task**  The student submits the Unit 3 Outcome 3 SAT – Part 1 for assessment. | Submitted | Submission of Unit 3 Outcome 3 SAT – Part 1. |  |  |

I declare that all resource materials and assistance used have been acknowledged and that all unacknowledged work is my own.

Student signature ……………………………………………….,,,,,… Date …………………………………

Authentication record form: VCE Algorithmics (HESS) 2024

Unit 4 School-assessed Task

This form must be completed by the class teacher. It provides a record of the monitoring of the student’s work in progress for authentication purposes. This form is to be retained by the school and filed.   
It may be collected by the VCAA as part of the School-based Assessment Audit.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |

Student name …………………………………………………………….. Student No

School …………………………………………………………………… Teacher: ……………………………………..…………………………………………….

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component of School-assessed Task** | **Date observed and submitted** | **Teacher comments** | **Teacher’s initials** | **Student’s initials** |
| **Observation 5: Determining time complexity**  **(Criterion 5) Unit 4 Outcome 1 SAT – Part 2**  The student determines the time complexty of their Unit 3 Outcome 3 solution. | Observed | Obervation of analysis of time complexity of their initial solution |  |  |
| **Observation 6: Time complexity implications**  **(Criterion 6) Unit 4 Outcome 1 SAT – Part 2**  The student explains the consequences of the time complexity of their Unit 3 Outcome 3 solution. | Observed | Explanation of consequences of the time complexity of their initial solution. |  |  |
| **Observation 7: Design of an improved algorithmic solution**  **(Criterion 8) Unit 4 Outcome 2 SAT – Part 3**  The student designs an improved algorithmic solution. | Observed | Observation of the documented design process and solution. |  |  |
| **Observation 8: Algorithmic problem-solving**  **(Criterion 9) Unit 4 Outcome 2 SAT – Part 3**  The quality of the student’s improved solution. | Observed | Observation of the quality of the improved design. |  |  |
| **Observation 9: Further formal analysis**  **(Criterion 5) Unit 4 Outcome 1 SAT – Part 2**  The student analyses the time complexity of their improved algorithmic solution. | Observed | Observation of analysis of the time complexity of an improved solution. |  |  |
| **Observation 10: Comparison of solutions**  **(Criteria 7 & 10) Unit 4 Outcomes 1 and 2 SAT – Parts 2 and 3**  The student compares the suitability of their solutions. | Observed | Observation of comparison the initial and improved solutions. |  |  |
| **Submission of Unit 4 Outcomes 1 and 2 School-assessed Task**  The student submits the Unit 4 Outcomes 1 and 2 SAT – Parts 2 and 3 for assessment. | Submitted | Submission of Unit 4 Outcomes 1 and 2 SAT – Parts 2 and 3. |  |  |

I declare that all resource materials and assistance used have been acknowledged and that all unacknowledged work is my own.

Student signature ……………………………………………………….. Date …………………………………

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2024** | Victorian Certificate of Education  Algorithmics (HESS) Assessment Sheet  School-assessed Task | | | | | | | | | | | STUDENT NAME | | | | | | | | | | |
| This assessment sheet will assist teachers to determine their score for each student. Teachers need to make judgments on the student’s performance for each criterion. Teachers will be required to choose one number from 0–10 to indicate how the student performed on each criterion with comments, as appropriate. Teachers then add the subtotals to determine the total score. | | | | | | | | | | | | student number | |  |  |  |  |  |  |  |  |  |
| assessing school number | | | | | |  |  |  |  |  |
|  | | | | | | | | | | | |  | | | | | | | | | | |
| **Criteria for the award of grades** | | | Not Shown (0) | Very Low (1–2) | Low  (3–4) | | | Med  (5–6) | High  (7–8) | | Very High (9–10) | **Performance on Criteria: Teacher’s Comments**  You may wish to comment on aspects of the student’s work that led to your assessment. | | | | | | | | | | |
| **The extent to which the student demonstrates:** | | |  |  |  | | |  |  | |  |
| 1. Skills in specifying a problem and modelling its key features | | |  |  |  | | |  |  | |  |
| 2. Skills in the design of an algorithm to solve a real-world/applied problem. | | |  |  |  | | |  |  | |  |
| 3. Skills in the communication of an algorithmic solution to a real-world/applied problem. | | |  |  |  | | |  |  | |  |
| 4. Skills in the justification of an algorithmic solution to a real-word/applied problem. | | |  |  |  | | |  |  | |  |
| 5. Skills in determining the time complexity of algorithms. | | |  |  |  | | |  |  | |  |
| 6. Understanding of the consequences of an algorithm’s time complexity on its real-world application. | | |  |  |  | | |  |  | |  |
| 7. Skills in the comparison of the time complexities of algorithmic solutions to a real-world/applied problem. | | |  |  |  | | |  |  | |  |
| 8. Skills in the design of an improved data model and algorithm combination. | | |  |  |  | | |  |  | |  |
| 9. Skills in advanced algorithmic problem solving. | | |  |  |  | | |  |  | |  |
| 10. Skills in the comparison of algorithmic solutions in terms of their coherence and fitness for purpose. | | |  |  |  | | |  |  | |  |
| If a student does not submit the School-assessed Task  at all, N/A should be entered in the total score box. | | **SUBTOTALS** |  |  | |  |  | | |  |  | |  | | | | | | | | | |

**TOTAL SCORE**