

VCE Algorithmics (HESS)

School-assessed Task

Video 2

Unit 3 Outcome 3

SAT Criteria 1–4

Acknowledgement of Country

The VCAA respectfully acknowledges the Traditional Owners of Country throughout Victoria and pays respect to the ongoing living cultures of First Peoples.



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School-assessed Task

Video 2

Unit 3 Outcome 3

SAT Criteria 1–4

Phil Feain

Digital Technologies Curriculum Manager

VCAA



VICTORIAN CURRICULUM
AND ASSESSMENT AUTHORITY



Outline of presentation

- Nature of task
- SAT Criteria 1–4
- Authentication
- Assessment
- Issues identified after marking Unit 3 Outcome 3

Nature of task

Unit 3 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

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

Unpacking the criteria

Criteria 1–4

Scope of task

Criterion 1

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.

Criterion 1

VCE Algorithmics (HESS): School-assessed Task 2023							
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. <ul style="list-style-type: none"> Specifies an algorithmic problem. Explains the salient features of the real-world/applied problem. Models the problem using ADTs 	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.	
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.		
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 □	

Criterion 2

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 2

VCE Algorithmics (HESS): School-assessed Task 2023

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.	<ul style="list-style-type: none"> Considers suitable algorithmic approaches to the problem. Describes the design of an algorithmic solution to the real-world/applied 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.
			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.
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Criterion 3

Consideration of multiple solutions options

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.



Criterion 3

VCE Algorithmics (HESS): School-assessed Task 2023

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.	<ul style="list-style-type: none"> 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 <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/>	3 <input type="checkbox"/> 4 <input type="checkbox"/>	5 <input type="checkbox"/> 6 <input type="checkbox"/>	7 <input type="checkbox"/> 8 <input type="checkbox"/>	9 <input type="checkbox"/> 10 <input type="checkbox"/>

Criterion 4

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.

Criterion 4

VCE Algorithmics (HESS): School-assessed Task 2023

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.	<ul style="list-style-type: none"> 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 <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/>	3 <input type="checkbox"/> 4 <input type="checkbox"/>	5 <input type="checkbox"/> 6 <input type="checkbox"/>	7 <input type="checkbox"/> 8 <input type="checkbox"/>	9 <input type="checkbox"/> 10 <input type="checkbox"/>

Authentication

Authentication

Authentication record form: VCE Algorithmics (HESS) 2023

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

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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

Assessment

Assessment

2023

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

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-world/applied problem.

Not Shown (0)	Very Low (1–2)	Low (3–4)	Med (5–6)	High (7–8)	Very High (9–10)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Performance on Criteria: Teacher's Comments

You may wish to comment on aspects of the student's work that led to your assessment.

Issues identified after marking Unit 3 Outcome 3

Issues identified after marking Unit 3 Outcome 3

If the design of the data model and algorithm combination to solve a real-world/applied problem in Unit 3 Outcome 3 is incomplete or contains significant errors, students may not have a functioning algorithm to analyse for the Unit 4 Outcome 1 component. In this situation, the teacher may need to provide the student with a minimal functional solution, such as a brute-force solution, to the Unit 3 Outcome 1 task for the student to analyse. The modified design will not be reassessed and the original score will stand. This will prevent negative consequential effects for the second component of the SAT in Unit 4 Outcome 1.

Review of presentation

In this video we looked at:

- Nature of the task
- SAT Criteria 1–4
- Authentication
- Assessment
- Issues identified after marking Unit 3 Outcome 3

Contact

- **Phil Feain – Digital Technologies Curriculum Manager (VCAA)**
- **Ph: (03) 9059 5146**
- **Philip.Feain@education.vic.gov.au**

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