VCE Algorithmics (HESS) 2023
Unit 3 School-based Assessment

Video 2
Background to the
Unit 3 Outcome 1 SAC

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

VICTORIA State Government

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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Purpose of this presentation

- to build the capacity of teachers to develop compliant, rigorous and engaging VCE assessment tasks in line with the VCE assessment principles
- provide an overview of the Unit 3 Outcome 1 School-assessed Coursework (SAC) task.

Outline of the presentation

This presentation will cover:

- Planning and considerations
- The Unit 3 Outcome 1 task
- Key knowledge and key skills
- VCAA Performance descriptors
- Designing the assessment task
- Developing the marking scheme
- VASS dates for 2023

Unit 3 Outcome 1
School-assessed Coursework (SAC)

Developing a compliant, engaging and rigorous assessment task

Planning

When you are ready to write the assessment task have the following documents in front of you (These are all on the Algorithmics (HESS) study page):

- Algorithmics (HESS) Study Design – U3 AoS1 Data modelling with abstract data types – pages 9–13
  - Area of Study statement, Outcome statement, Key knowledge and Key skills
- Support material: *Planning and Assessment:*
  - Unit 3 Area of Study 1 – Sample approaches to developing an assessment task
  - Unit 3 and 4 Performance descriptors: Unit 3 Outcome 1 – Performance descriptors
- On-demand videos:
  - Unit 3 Outcome 1 Background to the SAC
  - Unit 3 Outcome 1 Planning the SAC

Some considerations

The teacher must decide the most appropriate task for their cohort, time and conditions for conducting the task and inform the students ahead of the date. This decision is a result of several considerations including:

- the outcome being assessed and the task type
- the estimated time it will take to teach the key knowledge and key skills for the outcome
- the likely length of time required for students to complete the task
- the classroom environment the assessment task will be completed in
- whether the assessment task will be completed under open-book or closed-book conditions
- any additional resources required by students
- when tasks are being conducted in other subjects and the workload implications for students.

Unit 3 Outcome 1 – The outcome

On completion of this unit the student should be able to define and explain the representation of information using abstract data types, and devise formal representations for modelling various kinds of real-world information problems using appropriate abstract data types.

Unit 3 Outcome 1 – The assessment task

Contribution to final assessment

School-assessed Coursework for Unit 3 will contribute 12 per cent to the study score.

Outcomes	Marks allocated	Assessment tasks
Outcome 1 Define and explain the representation of information using abstract data types, and devise formal representations for modelling various kinds of real-world information problems using appropriate abstract data types.	50	In response to given stimulus material, create one or more designs of a data model using abstract data types to capture the salient aspects of a real-world information problem.
Outcome 2 Define and explain algorithmic design principles, design algorithms to solve information problems using basic algorithm design patterns, and implement the algorithms.	50	In response to given stimulus material: • create one or more designs of algorithms that apply algorithm design patterns or select appropriate graph algorithms to solve information problems • implement an algorithm.
Total marks	**100**	

Key knowledge

- the motivation for using ADTs
- signature specifications of ADTs using operator names, argument types and result types
- specification and uses of the following ADTs:
  - set, list, array, dictionary (associative array)
  - stack, queue, priority queue
  - graphs, including undirected and directed graphs and unweighted and weighted graphs
- features of graphs, including paths, weighted path lengths, cycles and subgraphs
- categories of graphs, including complete graphs, connected graphs, directed acyclic graphs and trees, and their properties
- modularisation and abstraction of information representation with ADTs
- the structure of decision trees and state graphs

Teaching towards the assessment task

Learning activities have been developed to meet the Unit 3 Outcome 1 Key knowledge bullet points.

These learning activities can be found in the Support material.

Examples of learning activities

- Compare the input and output data for a curated selection of problems and identify similarity in the structural features of the data, such as basic data types, ordering, uniqueness or inter-relationships between the data.

- Students are guided through the process of writing signature specifications for known processes. Processes could be described in a range of ways, such as in pseudocode, plain language, flow charts or through an IPO chart.

- Explore conventions in algorithms written in pseudocode and coding languages for representing ADTs and the typical operations, expected inputs and expected outputs. Activities can include execution trace of existing or created algorithms that use these ADTs, in particular graph traversal algorithms within the study.

Key skills

- explain the role of ADTs for data modelling
- read and write ADT signature specifications
- use ADTs in accordance with their specifications
- identify and describe properties of graphs
- apply ADTs to model real-world problems by selecting an appropriate ADT and justifying its suitability
- model basic network and planning problems with graphs, including the use of decision trees and state graphs

VCAA Performance descriptors

ALGORITHMICS (HESS) UNIT 3 OUTCOME 1 SCHOOL-ASSESSED COURSEWORK					
Performance descriptors					
	DESCRIPTOR: typical performance in each range				
	Very low	**Low**	**Medium**	**High**	**Very high**
Unit 3 **Outcome 1** **On completion of this unit the student should be able to define and explain the representation of information using abstract data types, and devise formal representations for modelling various kinds of real-world information problems using appropriate abstract data types.**	Identifies some motivations for the abstraction of data.	Discusses how an ADT property could be used to model an aspect of a particular problem. Little discrimination is demonstrated when identifying features of the problem.	Explains the role of ADTs for data modelling.	Describes in detail the suitability of appropriate ADTs for creating a model in a given problem context.	Compares and justifies the selection of appropriate ADTs for creating a model and outlines limitations of different representations.
	Uses limited metalanguage when describing ADTs.	Executes a sequence of ADT operations to a given ADT instance.	Reads, writes and uses ADTs.	Writes complete signature specifications for several ADTs, fully in appropriate metalanguage.	Specifies a non-trivial new operation for one of the standard ADTs to meet requirements that cannot be satisfied by the standard definition.
	Limited use of terminology in describing graph properties.	Confirms or rejects the properties of a graph given as a diagram.	Identifies and describes the properties of graphs.	Analyses the interconnections between the properties of graphs using correct terminology.	Analyses the properties satisfied by a given graph and derives another graph property using as evidence the existing specified properties of graphs.
	Identifies an example problem attribute that could be modelled by a graph node or edge.	Discusses some aspects of a problem, including planning problems from a given data model instance.	Applies ADTs to real-world problems. The full range of problem instances can be represented.	Models and fully represents a specific problem instance as a data model using a combination of ADT representations.	Models fully a specific problem instance as a data model with a combination of ADTs, and appropriately justifies the assigned priority of several aspects of the problem to the specific context of the problem.
	Scaffolding is required to create a basic model.	Some aspects of the problem are modelled.	Models basic network and planning problems with graphs.	Models and fully represents planning problems using the graph ADT in combination with other ADTs where appropriate.	Models fully and justifies the priorities used in the representation of the planning problem using graph and other ADTs.

Designing the assessment task

- Students should be advised of the timeline and conditions under which the task is to be completed.
- The assessment task must directly assess the student's understanding of the key knowledge and key skills as well as their ability to apply these to the assessment task.
- Due dates and duration of assessment is a school-based decision.
- Students should be given instructions regarding the requirements of the task, including time allocation, format of student responses and the marking scheme/assessment criteria.
- The marking scheme/assessment criteria used to assess the student's level of performance should reflect the VCAA performance descriptors and key skills.

Use of Key knowledge, Key skills and Performance descriptors

- Consider how the Outcome statement, Key knowledge, Key skills and VCAA Performance descriptors connect together.
- By reading the Key knowledge, Key skills and performance descriptors alongside each other, tasks can be developed for assessment that covers the performance descriptors.

Developing the marking scheme

- List the VCAA performance descriptors and key skills.
- For each performance descriptor or key skill, list the activities required to demonstrate competency.
- Consider how many marks out of 50 that you would allocate for each descriptor.
- Determining the weightings of the descriptors or components of the task:
  - Think of the time expended by students for each part of the task, and allocate marks according to likely student effort areas.
  - Think of the difficulty of specific tasks. Ensure that there is a chance for your struggling students to demonstrate levels of competency in the task.
- Develop your marking scheme/assessment criteria.
- You need to have a range of marks allocated for the levels of performance. This helps you to spread your student marks out.

VASS SAC dates for 2023

- **Unit 3 School-based Assessment – September**
  - Algorithmics (HESS): Unit 3 Outcome 1
  - Algorithmics (HESS): Unit 3 Outcome 2
- **Unit 4 School-based Assessment – November**
  - Algorithmics (HESS): Unit 4 Outcome 3

Teachers should be aware of the dates for submission of scores into VASS in September and November. These dates are published in the 2023 Important Administrative Dates and Assessment Schedule, published annually on the VCAA website.
vcaa.vic.edu.au/pages/schooladmin/admindates/index.aspx.

Review of presentation

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