2017 VCE Systems Engineering: Administrative advice for School-based Assessment in 2017

Units 3 and 4

School-assessed Task

The School-assessed Task contributes 50 per cent to the study score and is commenced in Unit 3 and completed in Unit 4.

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 1 and Unit 4 Outcome 1. The recorded scores must be based on the teacher's assessment of the student's performance according to the criteria on pages 8–16. This assessment is subject to the VCAA's statistical moderation process.

The 2017 Systems Engineering assessment sheet on page 21 is to be used by teachers to record scores. The completed assessment sheet for each student's School-assessed Task must be available on request by the VCAA. The performance descriptors for the assessment criteria are published annually on the Systems Engineering 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 and VCAL Administrative Handbook*.

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

The School-assessed Task has two components.

- Unit 3 Outcome 1
- Unit 4 Outcome 1

Unit 3

Integrated systems engineering and energy

Outcome 1

Investigate, analyse and use advanced mechanical-electrotechnology integrated and control systems concepts, principles and components, and using selected relevant aspects of the Systems Engineering Process, design, plan and commence construction of an integrated and controlled system.

Nature of task

A record of investigation, design, planning and production

and

preliminary production work.

Unit 4

Systems control and new and emerging technologies

Outcome 1

Produce, test and diagnose an advanced mechanical-electrotechnology integrated and controlled system using selected relevant aspects of the Systems Engineering Process, and manage, document and evaluate the system and processes.

Nature of task

Production work accompanied by a record of progress and modifications (pictorial, text material and other media)

and

A report of diagnostic testing and performance data

and

A report that evaluates and suggests improvements to the student's use of the Systems Engineering Process, and the operational system with reference to the factors that influenced its development and use.

Scope of task

The record of investigation, design, planning and production should reflect the Systems Engineering Process within the cross-study specification on page 12 of the *VCE Systems Engineering Study Design (2013–2018)* and the factors that may influence the design, planning, production and use of an integrated and controlled system.

The record must include the following:

- a design brief, developed by the student, which identifies and documents the problem/need/ opportunity or situation requiring a systems engineering solution, and the context, constraints and considerations that apply, including reference to the factors that may influence the design, planning production and use of a system
- initial research and identification of existing components, systems or subsystems to produce the required outputs that could represent a response or solution (in part or as a whole) to the design brief, and their function, operation, concepts and principles

relevant criteria for evaluating the integrated, controlled system and the student's use of the Systems Engineering Process. These should be drawn from the design brief and link to the stages of the Systems Engineering Process and factors that influence the design, planning, production and use of the intended system. Evaluation criteria for the system should be written as a question, with each having a justification and explanation of its relevance to the design brief, and how it can be checked or tested when the system is completed

- research (background information) to produce ideas for the design options including coverage of the factors influencing the design, planning, production and use of the system, including function, user needs and requirements, components, materials, environment the system will be used in, safety, the ways waste and energy can be minimised and associated costs. Additional factors may include (as relevant to the system to be produced) Australian and quality standards and regulations, styling and appearance, performance and durability, size, maintenance requirements and production methods (including machinery and equipment needed to make the system). Students must accurately cite all sources (both primary and secondary) of information used
- appropriate reference to the function and operation of mechanical and electrical/electronic components (including those used for control), and the application of relevant concepts and principles in identifying solution options to meet the requirements of the design brief. Calculations should be used to inform function and/or performance of components, sub-systems and systems to achieve required outputs. Appropriate use should be made of diagrammatic and symbolic representation and technical language
- design alternatives and options and selection of the preferred option. Three or four design options should be developed. The alternatives and options must relate to the design brief and describe components and subsystems that constitute potential solutions. Sketches, drawings and diagrams must show annotated references to proposed specifications, processes, materials or components and the relevance to the design brief. The justification of the preferred option must be clearly indicated
- design and modelling of the integrated controlled system, including computer simulation and modelling, sketches, block (IPO) and flow diagrams, working drawings, annotations, programming, PCB artwork for the configuration, assembly, integration and resourcing of manufactured systems, subsystems and components intended to produce an operational controlled system
- components and materials list, including sources and cost
- using a project management approach, the development of a production timeline and work plan including sequence of operations (for example, a Gantt chart), processes and intended tools, equipment and machines, proposed methods of diagnostic testing, for the manufacture of the integrated system and all accompanying risk assessments for production work and diagnostic testing
- a record of progress that includes photographic evidence of production work (for example, logbook or photo journal), including decisions made and notes of modifications with justifications.

In Unit 4, the diagnostic testing report and performance data will include references to ongoing diagnostics and the adjustments or modifications made to ensure optimal performance, and also to the results of at least one test carried out on the student's completed system to assess the functioning and performance of the integrated system with a control device, providing it is not hazardous to do so.

When undertaking test procedures students need to document (using appropriate technical language):

- the purpose of the test
- procedural steps (including risk assessment and management) to perform the test, including the equipment used (documentation should include images)
- expected results
- actual results of the test in quantified (numerical) form, including SI units and technical terms
- application of formulas to calculate and determine mechanical and electrical parameters
- modification or repairs made as a result of the diagnostic testing
- explanation of the results.

Students are also required to produce an evaluation report. This report includes:

- an evaluation (using previously developed criteria) of the operational integrated controlled system and suggestions of how it could be further improved
- evaluation of their use of the Systems Engineering Process, including effectiveness of documentation and efficiency of management of the project and their work processes and practices
- identification of how the factors that may influence the design, planning, production and use of the system were taken into account
- modifications and areas for further improvement in the system and their use of the Systems Engineering Processes.

One integrated controlled system only is to be completed over Units 3 and 4. Students cannot score highly if the system is not integrated or does not incorporate control – either closed or open loop. By the end of Unit 3 the production work should be partially constructed. By the end of Unit 4 the production work will result in an operational product in the form of an integrated system with some means of control, i.e. a system that is a functional integration of a mechanical subsystem (includes pneumatic, hydraulic) and an electrotechnology (electrical/electronic) subsystem (includes microelectronic). All systems must be compliant with safety standards, regulations and Australian Standards. Risk assessment and risk management must be addressed throughout the design, planning, construction, testing and operation of the system, consistent with safety standards, laws and regulations. **Teachers must record individual student adherence to safety procedures and project management on the Systems Engineering Teacher Additional Comment Sheet on page 20.**

Where appropriate, students should use information and communications technology (ICT) in the record of investigation, design, planning and production and documenting diagnostic testing and in the evaluation report.

Teachers must sight and monitor the development and documentation of the student's work on a regular basis. The Authentication Record Form for the Systems Engineering School-assessed Task on page 19 should be used for monitoring students' work in progress for authentication purposes. This sheet must be available if requested by the VCAA.

Note that for the entire School-assessed Task, students must work on their own design and production work. It is not a group project.

Safety

Please refer to the information under Safety and welling on p. 8 of the study design for specific information about electrical safety.

Advice on the use of the 2017 Systems Engineering Teacher Additional Comment Sheet

The purpose of the 2017 Systems Engineering Teacher Additional Comment Sheet published on page 20 is for the teacher to document student production skills, for the purpose of school-based assessment audit and review.

Teachers should make ongoing notes of observations of each student during the production of the School-assessed Task on the comment sheet, which provides teachers with the opportunity to present written information that may be required to support School-based Assessment audit and review. As the production work for the School-assessed Task occurs over a period of time, the Systems Engineering Teacher Additional Comment Sheet can also assist teachers in their record keeping. Teachers may find it useful to refer to the comments on the sheet when assessing the four criteria related to the production work. The criteria related to the production work for Systems Engineering are Criteria 4, 5, 6 and 7. These criteria relate to the key knowledge and skills listed in the study design.

The following information and questions are provided to assist teachers with the type of information they should include on the Systems Engineering Teacher Additional Comment Sheet. Teachers are not expected to separately address each question listed below for each student. Rather, the questions are intended to provide guidelines as to what information teachers should record.

Criterion 4: Skill in the application of processes in producing an integrated controlled system

- Did the student safely carry out a range of processes (some of which were advanced, difficult or complex) in the production of the product? (Processes that are not evident in the record of design, planning and production or the production work could be noted.)
- Did the student follow their own or teacher-generated risk management processes?
- Did the student show a practical understanding of the relationship between the production sequence, processes and timelines?
- Did the student show a practical understanding of the systems concepts and principles?
- The teacher could also note the level of independence demonstrated by the student when applying the processes.

Criterion 5: Skill in the use of tools, equipment and machines

- Did the student demonstrate competence and technical skill in the use of a range of tools, equipment and machines?
- Is the product functional or non-functional (or has it at some stage been functional)? (Please note that functionality or performance of the product may relate to the way the student has used the tools and equipment.)
- Does the product look neat and tidy? (Parts that may be hidden should be considered in making this comment.)

Criterion 6: Understanding of appropriate diagnostic test procedures and the analysis of test data

- Has the student been able to plan and carry out diagnostic testing with little assistance and direction?
- Have the appropriate procedures been followed?
- Was testing equipment (devices to locate faults and measure performance) selected and used appropriately and accurately?
- Did the student use relevant technical information to assist in planning and carrying out test procedures (if not included in documentation)?
- Did the student make necessary modifications or carry out repairs so the systems would work or perform more effectively?

Criterion 7: Skill in project management and in realising the preferred option

- Was the student well organised?
- Did the student use time efficiently?
- Did the student use resources effectively and efficiently?
- Did the student make appropriate selections and use of materials, components, methods of assembly and conventions? Did the student make these selections independently and/or follow advice given by the teacher?
- Does the product perform in the intended way (i.e. the expected output) as outlined in the design and production work plan or as documented in the modifications?

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017						
Assessor:			Student:		Student number:	
Assessment Criteria	**Levels of Performance**					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
1. Skill in investigating a problem/situation/opportunity/need, existing components, subsystems and systems to achieve specific outputs and develop a design brief for an integrated controlled system	0 ❑	Very limited definition of problem/situation/opportunity/need within a limited design brief that includes very little reference to factors that may influence design, planning, production and use of a system. Very limited investigation of relevant existing components, subsystems and systems in terms of their function and/or operation that produce outputs relevant to the defined problem/situation/opportunity/need. Very little reference to related mechanical and electrical/electronic concepts and principles for the proposed integrated controlled system. Very little understanding of proposed project with very limited statement of what was intended to be built. 1 ❑ 2 ❑	Partially defined problem/situation/opportunity/need within a design brief that includes adequate reference to factors that may influence design, planning, production and use of a system. Some investigation of relevant existing components, subsystems and systems in terms of their function and/or operation that produce outputs relevant to the defined problem/situation/opportunity/need. Little reference to related mechanical and electrical/electronic concepts and principles for the proposed integrated controlled system. Some understanding of proposed project with limited statement of what was intended to be built. 3 ❑ 4 ❑	Adequately defined problem/situation/opportunity/need within a design brief that includes sufficient reference to factors that may influence design, planning, production and use of a system. Satisfactory investigation of relevant existing components, subsystems and systems in terms of their function and/or operation that produce outputs relevant to the defined problem/situation/opportunity/need. Appropriate reference to related mechanical and electrical/electronic concepts and principles for the proposed integrated controlled system. Satisfactory understanding of proposed project with adequate statement of what was intended to be built. 5 ❑ 6 ❑	Clearly defined problem/situation/opportunity/need within a design brief that includes substantial reference to factors that may influence design, planning, production and use of a system. Thorough investigation of relevant existing components, subsystems and systems in terms of their function and/or operation that produce outputs relevant to the defined problem/situation/opportunity/need. Detailed reference to related mechanical and electrical/electronic concepts and principles for the proposed integrated controlled system. Clear insight into proposed project with clear statement of what was intended to be built. 7 ❑ 8 ❑	Very clearly defined problem/situation/opportunity/need within a design brief that includes substantial reference to factors that may influence design, planning, production and use of a system. Comprehensive investigation of relevant existing components, subsystems and systems in terms of their function and/or operation that produce outputs relevant to the defined problem/situation/opportunity/need. Highly detailed reference to related mechanical and electrical/electronic concepts and principles for the proposed integrated controlled system. Clear insight into proposed project with very clear statement of what was intended to be built. 9 ❑ 10 ❑

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017						
Assessor:			Student:		Student no:	
Assessment Criteria	**Levels of Performance**					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
2. Skill in researching, devising, designing and modelling design options and feasible alternatives		Limited range of research evident. Minimal documentation of related concepts and principles and use of modelling to determine likely outputs of the design alternatives and options. Very limited diagrammatic representation of ideas, options and alternatives. Very limited justification of the preferred option, with generalised references to trialling and testing.	Some relevant research from acknowledged resources. Some documentation of related concepts and principles and use of modelling and calculations to determine likely outputs of the design alternatives and options. Limited diagrammatic representation and annotation of ideas, options and alternatives using some appropriate technical language. Limited justification of the preferred option, with some references to trialling and testing.	Satisfactory range of relevant research from acknowledged resources. Appropriate documentation of relevant concepts and principles and use of modelling and calculations to determine likely outputs of the design alternatives and options. Adequately detailed diagrammatic representation and annotation of ideas, options and alternatives using appropriate technical language. Clear justification of the preferred option, with references to relevant trialling and testing.	Wide range of highly relevant research from acknowledged resources. Careful documentation of relevant concepts and principles and accurate use of relevant modelling and calculations to determine likely outputs of the design alternatives and options. Highly detailed diagrammatic representation and annotation of innovative ideas, options and alternatives using appropriate technical language. Well-developed justification of the preferred option, with thorough references to relevant trialling and testing.	Comprehensive range of highly relevant research from acknowledged resources. Thorough documentation of relevant concepts and principles and accurate use of relevant modelling and calculations to determine likely outputs of the design alternatives and options. Very highly detailed diagrammatic representation and annotation of highly innovative ideas, options and alternatives using appropriate technical language. Highly developed justification of the preferred option, with comprehensive references to relevant trialling and testing.
	0 ❑	1 ❑ 2 ❑	3 ❑ 4 ❑	5 ❑ 6 ❑	7 ❑ 8 ❑	9 ❑ 10 ❑

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017						
Assessor:			Student:		Student number:	
Assessment Criteria	**Levels of Performance**					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
3. Skill in planning the system and developing evaluation criteria		Very limited plan and a minimal materials/components list. Limited understanding of the necessary tools, equipment, machines and processes to produce the system. Some risk assessment listed. Very limited criteria to evaluate the system and the application of the Systems Engineering Process.	A plan with limited sequence and a basic materials/ components list. Some understanding of the necessary tools, equipment, machines and processes to produce the system, and limited risk assessment and management documentation. Limited criteria to evaluate the system and the application of the Systems Engineering Process.	Adequately sequenced plan and satisfactory materials/ components list. Sound level of understanding of the necessary tools, equipment, machines and processes to produce the system, and adequate risk assessment and management documentation. Appropriate and relevant criteria to evaluate the system and the application of the Systems Engineering Process.	Clear and logically sequenced plan and a detailed materials/ components list. Competent understanding of the necessary tools, equipment, machines and processes to produce the system, and detailed risk assessment and management documentation. Detailed, relevant and considered criteria to evaluate the system and the application of the Systems Engineering Process.	Very clear and logically sequenced plan and a very comprehensive materials/ components list. High-level understanding of the necessary tools, equipment, machines and processes to produce the system, and very broad and comprehensive risk assessment and management documentation. Comprehensive, relevant and well-articulated criteria to evaluate the success of control and integration of the system and the application of the Systems Engineering Process.
	0 ❑	1 ❑ 2 ❑	3 ❑ 4 ❑	5 ❑ 6 ❑	7 ❑ 8 ❑	9 ❑ 10 ❑

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017						
Assessor:			Student:		Student number:	
Assessment Criteria	**Levels of Performance**					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
4. Skill in the application of processes in producing an integrated controlled system	0 ❑	Demonstrates limited skill in the safe application of a limited range of processes. A very limited level of integration and control in the system is shown. Very little understanding of the relationship between the production sequence, processes and timelines, and systems concepts and principles relevant to the system being produced. 1 ❑ 2 ❑	Demonstrates some skill in the safe application of a few processes. A limited level of integration and control in the system is shown. Limited understanding of the relationship between the production sequence, processes and timelines, and systems concepts and principles relevant to the system being produced. 3 ❑ 4 ❑	Demonstrates a satisfactory level of skill in the safe application of a wide range of processes, including at least one with a high degree of difficulty. An adequate level of integration and control in the system is shown. Adequate understanding of the relationship between the production sequence, processes and timelines, and systems concepts and principles relevant to the system being produced. 5 ❑ 6 ❑	Demonstrates a high level of skill in the safe application of a wide range of processes, including several with a high degree of difficulty. A high level of integration and control in the system is shown. Well-developed understanding of the relationship between the production sequence, processes and timelines, and systems concepts and principles relevant to the system being produced. 7 ❑ 8 ❑	Demonstrates a very high level of skill in the safe application of a wide range of processes, including several with a high degree of difficulty. A very high level of integration and control in the system is shown. Comprehensive understanding of the relationship between the production sequence, processes and timelines, and systems concepts and principles relevant to the system being produced. 9 ❑ 10 ❑

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017						
Assessor:			Student:		Student no:	
Assessment Criteria	**Levels of Performance**					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
5. Skill in the use of tools, equipment and machines	0 ❑	Demonstrates very little skill in the correct and safe use of a limited range of tools, equipment and machines. Very limited standard in the appearance and operational status of the system is achieved through the use of some tools, equipment and machines. Very low-level of management of risk is demonstrated throughout production. 1 ❑ 2 ❑	Demonstrates some skill in the correct and safe use of some tools, equipment and machines. Limited standard in the appearance and operational status of the system is achieved through the correct use of some tools, equipment and machines. Low-level management of risk is demonstrated throughout production. 3 ❑ 4 ❑	Demonstrates a satisfactory level of technical skill in the correct and safe use of a range of tools, equipment and machines. Adequate standard in the appearance and operational status of the system is achieved through the correct use of most tools, equipment and machines. Appropriate level of management of risk is demonstrated throughout production. 5 ❑ 6 ❑	Demonstrates a competent level of technical skill in the correct and safe use of a wide range of tools, equipment and machines. High standard in the appearance and operational status of the system is achieved through the correct and effective use of all tools, equipment and machines. High-level management of risk is demonstrated throughout production. 7 ❑ 8 ❑	Demonstrates a very high level of technical skill in the correct and safe use of a wide range of tools, equipment and machines. Very high standard in the appearance and operational status of the system is achieved through the correct and effective use of all tools, equipment and machines. Very high-level management of risk is demonstrated throughout production. 9 ❑ 10 ❑

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017						
Assessor:			Student:		Student no:	
Assessment Criteria	**Levels of Performance**					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
6. Understanding of appropriate diagnostic test procedures and the analysis of test data		Identifies the purpose and provides a very limited description of the tests. Very limited test implementation skills. Presents very limited test data. Basic interpretation of test data to explain the actual results. Limited modifications and/or repairs are made to improve the performance of the system.	Identifies the purpose and provides a limited description of the tests. Some test implementation skills. Presents some quantified test data. Some use of technical information and interpretation of test data to explain the actual results, using appropriate technical language and SI units. Some modifications and/or repairs are made to improve the performance of the system.	Provides relevant descriptions of the purpose of, and procedural steps for, the tests. Adequate test implementation skills. Presents mostly relevant and quantified test data. Satisfactory use of relevant technical information and adequate interpretation of test data to explain the actual results, using appropriate technical language and SI units. Appropriate modifications and/or repairs are made to optimise the performance of the system.	Provides accurate and relevant descriptions of the purpose of, and procedural steps for, the tests. Highly skilled test implementation. Presents relevant and quantified test data. Full use of relevant technical information and detailed, accurate interpretation of test data to clearly explain the actual results, using appropriate technical language and SI units. Effective modifications and/or repairs are made to optimise the performance of the system.	Provides accurate, relevant and very detailed descriptions of the purpose of, and procedural steps for, the tests. Very highly skilled test implementation. Presents accurate, relevant and quantified test data. Highly relevant and carefully planned tests, supported by research of relevant data, including the development of additional test conditions to reduce error, are skilfully undertaken and documented. Extensive use of relevant technical information and insightful, accurate interpretation of test data to thoroughly explain the actual results, using appropriate technical language and SI units. Highly effective modifications and/or repairs are made to optimise the performance of the system.
	0 ❑	1 ❑ 2 ❑	3 ❑ 4 ❑	5 ❑ 6 ❑	7 ❑ 8 ❑	9 ❑ 10 ❑

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017						
Assessor:			Student:		Student number:	
Assessment Criteria	**Levels of Performance**					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
7. Skill in project management and in realising the preferred option		Very limited project management techniques and skill in the application of the Systems Engineering Process. Very limited management of physical resources to achieve production work of a limited quality and an incomplete integrated system. Incomplete documentation of decision-making and modifications to the preferred option. A very limited skill level demonstrated in managing processes and partially realising the preferred option. Very little initiative shown in addressing the factors that influence the design, planning, production and use of the system.	Some understanding of project management and skill in the application of the Systems Engineering Process. Limited management of physical resources to achieve production work of an adequate quality and a functional integrated system. Some documentation of justified decision-making and modifications to the preferred option. A limited skill level demonstrated in managing processes and realising the preferred option. Some initiative shown in addressing the factors that influence the design, planning, production and use of the system.	Adequate project management and skill in the application of the Systems Engineering Process. Effective management of physical resources to achieve production work of a high quality and a functional integrated system. Adequate documentation of justified decision-making and modifications to the preferred option. An appropriate skill level demonstrated in managing processes and realising the preferred option. Exhibits an appropriate level of initiative in addressing the factors that influence the design, planning, production and use of the system.	High-level project management and skill in the application of the Systems Engineering Process. Effective and efficient management of physical resources to achieve production work of a high quality and an innovative, functional integrated system. Thorough documentation of justified decision-making and modifications to the preferred option. High skill level demonstrated in managing processes and realising the preferred option Exhibits a high level of initiative in addressing the factors that influence the design, planning, production and use of the system.	Very effective project management and high-level skill in the application of the Systems Engineering Process. Highly effective and efficient management of physical resources to achieve production work of a high quality and an innovative, functional integrated system. Thorough and highly detailed documentation of justified decision-making and modifications to the preferred option. Very high skill level demonstrated in managing processes and realising the preferred option. Exhibits outstanding initiative in addressing the factors that influence the design, planning, production and use of the system.
	0 ❑	1 ❑ 2 ❑	3 ❑ 4 ❑	5 ❑ 6 ❑	7 ❑ 8 ❑	9 ❑ 10 ❑

VCE Systems Engineering: School-assessed Task Assessment Sheet 2017

Assessor:	Student:	Student number:

Assessment Criteria	Levels of Performance					
	Not shown	1–2 (very low)	3–4 (low)	5–6 (medium)	7–8 (high)	9–10 (very high)
8. Evaluation of the use of the Systems Engineering Process and of the finished, integrated controlled system		Provides a very limited review of the use of the Systems Engineering Process, including some consideration of the effectiveness of the investigation, design and planning stages, and efficiency of production activities, making some reference to the production work plan, record of progress and recorded modifications. Very limited discussion of the difficulties encountered and how these were addressed. Very limited evaluation of the suitability of the system and the extent to which it matches the investigation, design and production record, with limited reference to the factors that influenced the design, planning, production and evaluation criteria.	Provides a limited review of the use of the Systems Engineering Process, including some consideration of the effectiveness of the investigation, design and planning stages, and efficiency of production activities, making some reference to the production work plan, record of progress and recorded modifications. Some discussion of the difficulties encountered and how these were addressed. Limited evaluation of the suitability of the system and the extent to which it matches the investigation, design and production record, with limited reference to the factors that influenced the design, planning, production and evaluation criteria.	Provides a satisfactory review of the use of the Systems Engineering Process, including the effectiveness of the investigation, design and planning stages, and efficiency of production activities, making adequate reference to the production work plan, record of progress and recorded modifications. Satisfactory discussion of the difficulties encountered and how these were addressed. Appropriate evaluation of the suitability of the system and the extent to which it matches the investigation, design and production record, with reference to the factors that influenced the design, planning, production and evaluation criteria.	Provides a detailed review of the use of the Systems Engineering Process, including the effectiveness of the investigation, design and planning stages, and efficiency of production activities, making clear reference to the production work plan, record of progress and recorded modifications. Thorough discussion of the difficulties encountered and how these were addressed. Thoughtful evaluation of the suitability of the system and the extent to which it matches the investigation, design and production record, with reference to the factors that influenced the design, planning, production and evaluation criteria.	Provides a comprehensive review of the use of the Systems Engineering Process, including the effectiveness of the investigation, design and planning stages, and efficiency of production activities, making extensive reference to the production work plan, record of progress and recorded modifications. Very thorough discussion of the difficulties encountered and how these were addressed, providing an insight into the whole project. Perceptive evaluation of the suitability of the system and the extent to which it matches the investigation, design and production record with reference to the factors that influenced the design, planning, production and evaluation criteria.

	0 ❑	Provides a very limited explanation of areas for improvement to the finished system and management of the stages of the Systems Engineering Process. Some description of the suitability of the product with reference to the previously established criteria. 1 ❑ 2 ❑	Provides a limited explanation of areas for improvement to the finished system and management of the stages of the Systems Engineering Process. Limited evaluation of the suitability of the product with reference to the previously established criteria. 3 ❑ 4 ❑	Provides a clear explanation of areas for improvement to the finished system and management of the stages of the Systems Engineering Process. Adequate evaluation of the suitability of the product with reference to the previously established criteria. 5 ❑ 6 ❑	Provides a full explanation of areas for improvement to the finished system and management of the stages of the Systems Engineering Process. Detailed evaluation of the suitability of the product with reference to the previously established criteria. 7 ❑ 8 ❑	Provides a thorough explanation of areas for improvement to the finished system and management of the stages of the Systems Engineering Process. Comprehensive evaluation of the suitability of the product with reference to the previously established criteria. 9 ❑ 10 ❑

Authentication of VCE Systems Engineering School-Assessed Task (SAT)

Teachers are reminded of the need to comply with the authentication requirements specified in the VCE and VCAL Administrative Handbook 2017. 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 Systems Engineering School-assessed Tasks:

1. The Systems Engineering integrated controlled system created for the School-assessed Task (SAT) is based on Unit 3, Outcome 1 and Unit 4, Outcome 1.

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

3. Students are encouraged to research all aspects of their proposed production in detail, but the work undertaken for their record of investigation, design, planning and production must be their own. Teachers are reminded that it is not appropriate to provide 'detailed advice on, corrections to, or actual reworking of students' drafts or productions or folios'

4. The SAT is not a group project and students must work on their own design and production work for the entire SAT

5. During the planning stage, teachers should make clear to students that the written documentation and visual representations, required as part of the student's record of investigation, design, planning and production, form the basis for authentication of their work. For example, students are required to submit sketches, drawings and diagrams to show annotated references to proposed specifications, processes, materials or components and the relevance to the design brief. All notes should be dated and clearly documented to enable teachers to authenticate students' work.

6. The annotated design alternatives and options are part of the student's record of investigation, design, planning and production, and are a key reference for assessment of the system, which should be maintained and updated throughout the production process. The student's record of investigation, design, planning and production, together with the authentication record form, informs the teacher about how the student refers to the proposed specifications, processes, materials or components and their relevance to the design brief.

7. Teachers should make ongoing notes of observations of each student during the production of the SAT on the Systems Engineering Teacher Additional Comment Sheet. The sheet provides teachers with the opportunity to present written information that may be required to support school-based assessment and review. As the production work for the School-assessed Task occurs over a period of time, the Systems Engineering Teacher Additional Comment Sheet can also assist teachers in their record keeping. Teachers may find it useful to refer to the comments on the sheet when assessing the four criteria related to the production work. Some skills, particularly those relating to the use of tools, equipment, machines and safety measures may not be clearly documented by the student. Risk assessment and risk management must be addressed throughout the design, planning, construction,

testing and operation of the integrated controlled system, consistent with safety standards, laws and regulations. Teachers should supply written information based on observations of the student during practical work sessions, including individual student adherence to safety procedures and project management, on the Systems Engineering Teacher Additional Comment Sheet

8. Teachers must sight and monitor the development and documentation of the student's work on a regular basis in order to record each student's progress as part of the authentication process. The Authentication Record Form Systems Engineering School-assessed Task sheet must be completed by the class teacher to monitor the student's work-in-progress for authentication purposes. The student must declare that all resource materials and assistance used have been acknowledged and that all unacknowledged work is their own.

9. Any use of external support and/or equipment must be documented in the student's record of investigation, design, planning and production (for example, if a student uses equipment sourced from outside the school or uses prefabricated material, such as a powder coated steel frame or a complex circuit board, as part of their integrated controlled system). This is to ensure that any use of external support and/or equipment is appropriately limited and that the student does not receive undue assistance. All use of external support must be planned and documented in the student's record of investigation, design, planning and production and teachers must certify that such support does not constitute undue assistance.

10. Photographs taken during the production process must be true and accurate representations of a student's work. This ensures the integrated controlled system can be authenticated as a realisation of the design brief developed by the student and that the student is not receiving undue assistance in the production stage. This in turn ensures that all students are assessed equitably. All photographs should be dated.

11. Teachers are reminded that the authentication procedures are required to be followed for all student work in relation to this SAT. School-based audits include the inspection of authentication records. Where authentication records are not provided, the school is automatically audited the following year. Authentication records will also be required to be forwarded for all works nominated for Seasons of Excellence awards in 2017. Incomplete authentication records will result in an automatic disqualification of the student work from the nomination process.

Authentication Record Form: VCE Systems Engineering School-assessed Task 2017

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 its School-based Assessment audit.

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

School: ……

Teacher: ……

Component of School-assessed Task	Date observed/ submitted	Comments	Teacher's initials	Student's initials
Design brief and evaluation criteria				
Research (Note: all resources must be acknowledged)				
Design alternatives and options				
Design plan, production work plan, materials/components list and timeline				
Production work and record of progress (Note: all outsourced processes must be recorded)				
Production work (2nd observation)				
Production work (3rd observation)				
Diagnostic testing, data collection and report				
Evaluation of product and processes				
Final submission of School-assessed Task				

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

Student signature ……Date …….

VCE Systems Engineering
Teacher Additional Comment Sheet for 2017

School-assessed Task only

Some skills, particularly those relating to the use of tools, equipment, machines and safety measures may not be clearly documented by the student. Teachers should supply written information based on observations of the student during practical work sessions.

Please complete this sheet and retain at the school. The VCAA may request submission of this sheet as part of the school-based assessment audit and review.

Please refer to pages 4–5 for details on how to complete this sheet.

Student Number

Comments

Criterion 4

Criterion 5

Criterion 6

Criterion 7

Teacher's signature _____ Date _____/_____/2017

Please retain this sheet. It may be requested as part of the School-based Assessment audit.

2017

Victorian Certificate of Education

Systems Engineering Assessment Sheet

School–assessed Task: Designing, planning, production, testing and evaluation of an integrated technological system

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)
The extent to which the record of investigation design, planning and production demonstrate:						
1 skill in investigating a problem/situation/opportunity/need, existing components, subsystems and systems to achieve specific outputs and develop a design brief for an integrated controlled system						
2 skill in researching, devising, designing and modelling design options and feasible alternatives						
3 skill in planning the system and developing evaluation criteria						
The extent to which the production work and accompanying documentation, including the record of progress and modifications, demonstrate:						
4 skill in the application of processes in producing an integrated controlled system						
5 skill in the use of tools, equipment and machines						
The extent to which the diagnostic testing, report and performance data demonstrate:						
6 understanding of appropriate diagnostic test procedures and the analysis of test data						
The extent to which the production documentation and folio, and teacher observation of student progress throughout the Systems Engineering Process, demonstrate:						
7 skill in project management and in realising the preferred option						
The extent to which the evaluation report demonstrates:						
8 evaluation of the use of the Systems Engineering Process and of the finished, integrated controlled system						
SUBTOTALS						

TOTAL SCORE

If a student does not submit the School–assessed Task at all, N/A should be entered in the total score box.

Performance on Criteria: Teacher's Comments

You may wish to comment on aspects of the student's work that led to your assessment of Very High, High, Medium, Low, Very Low or Not Shown for specific criteria.