Set of tasks

Stage 2 Digital Technologies

Assessment Type 1: Project Skills

This set of 4 x project skills tasks for Assessment Type 1: Project Skills includes:

* Computational thinking skills task
* Data analysis skills task
* Design and programming skills task
* Iterative project development techniques task

This set of tasks can be used in its entirety or individual tasks can be selected. It should be noted that completion of the project development techniques task requires prior completion of the design and programming task.

Stage 2 Digital Technologies

Assessment Type 1: Project Skills Task 1

*Computational thinking task*

Purpose

Apply your computational thinking skills to plan a large task or event.

Assessment Description

Your task is to use computational thinking skills to plan a large task or event. An example of a large task or event might include planning:

* an 18th birthday party
* a garden renovation
* a music festival camping trip with friends
* an evacuation of a large building or series of buildings.

As a group:

* determine the individual roles for each group member to successfully complete the task.
* meet with the teacher at least twice to monitor how well your collaboration is working.

Work collaboratively to:

* break down the task into two or more tasks using a structure chart
* deduce as much new information as possible from the initial information provided, using a visual representation such as a mind map
* revisit and add the new information to the structure chart
* find repeating patterns in the different levels of the structure chart and represent these patterns in a flow chart(s)
* use abstraction to create generalised algorithms to resolve the repeating patterns
* develop algorithms to solve each level of the structure chart.

Your group should use a web-based collaborative tool to provide evidence of each individual’s role in and contribution to the task.

Assessment Conditions

Your group presents their findings in a multimodal presentation of no more than 5 minutes. Your presentation should include:

* at least one structure chart
* one mind map
* the algorithms you have developed, presented as flow charts.

Your presentation should be creative and provide evidence of:

* your application of computational thinking skills and techniques
* your use of abstraction to identify core concepts and ideas
* an explanation of each group member’s role in and contribution to the task.

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| *Learning Requirements* | *Assessment Design Criteria* |
| 1. apply computational thinking skills, including abstraction, to approach, identify, deconstruct, and solve problems of interest
2. analyse data sets related to problems of interest, to identify patterns and/or trends, draw conclusions, and make predictions
3. apply iterative project - development techniques to manage and evaluate proposed digital solutions to problems of interest
4. apply design and programming skills to create and document digital solutions
5. research and discuss ethical considerations in digital technologies
6. work individually and collaboratively to create and explain digital solutions.
 | Computational ThinkingThe specific features are as follows:CT1 Application of computational thinking concepts and techniques, to identify and deconstruct problems of interest.CT2 Use of abstraction to identify core concepts and ideas.CT3 Analysis of relationships in datasets to draw conclusions and make predictions.CT4 Application of skills and processes to develop solutions to problems of interest.Development and EvaluationThe specific features are as follows:DE1 Design and creation of digital solutions or a prototype.DE2 Application of iterative development, testing, modification, and documentation of a digital solution or prototype.DE3 Evaluation of the effectiveness of a digital solution or prototype.DE4 Explanation, with supporting evidence, of role in and contribution to projects.Research and EthicsThe specific features are as follows:RE1 Research into and discussion of the ethical considerations in digital technologies. |

Stage 2 Digital Technologies

Assessment Type 1: Project Skills Task 2

***Data analysis and visualisation task***

Purpose

Explore how datasets have been used to create innovative apps, interactive maps, websites, and/or other digital solutions.

Assessment Description

Explore how datasets have been used to create innovative apps, interactive maps, websites, and/or other digital solutions. Investigate the data sets and innovative ideas at <https://data.sa.gov.au/>.

Apply your computational thinking skills to analyse simple (linear) and complex (exponential or logarithmic) relationships in data sets associated with your selected problem of interest. Identify patterns and/or trends in the data, draw conclusions, and make predictions. The data may come from a public data set or it may be data you collect. The data sets you choose should inform your thinking about the issues related to trends associated with your problem of interest.

You should:

* define a research question or hypothesis around your problem of interest
* collect data that provides a focus for the research question by:
* designing and conducting your own surveys, and/or
* extracting data from online and public data sets, and/or
* capturing data using video cameras, sensors, or GPS tracking equipment
* check the data for currency, authenticity, relevance, accuracy, and outliers (clean data)
* identify patterns in the data
* use basic quantitative techniques to analyse data and tabulate results
* test your research question or hypothesis
* draw conclusions and make predictions from your analysis
* evaluate the ethical implications of data use relating to your problem of interest, focusing on one or more of the following:
* collection of personal data
* data security and storage
* data protection and back up
* data theft
* privacy and anonymising data
* cyber security.

**Assessment Conditions**

Prepare your report in multimodal form. Your report should be no more than 5 minutes, and should include graphical representation of your analysis and results. Your report should provide evidence of:

* your use of abstraction to identify core concepts and ideas
* your analysis of relationships in data sets, to draw conclusions and make predictions
* your research into, and evaluation of, the ethical implications of data use/

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Stage 2 Digital Technologies

Assessment Type 1: Project Skills Task 3

*Design and programming skills*

Assessment Description

Scenario:

The Science Faculty need you to create a practical solution to a problem in Biology. For some time now, a Biology teacher has been trying to get an aquaponics system functioning properly, but they are experiencing problems maintaining the balance of pH, ammonia, nitrates and nitrites.

The teacher needs a monitoring system that will alert them to variations in the concentrations of any of the variables listed above. They also require a temperature indicator.

You can find out more about aquaponics [here](http://www.backyardaquaponics.com/).

Working in pairs to:

* use computational thinking skills to deconstruct the problem
* determine the sensors you might need to use
* code a control program feature by feature using an iterative development process:
* variables
* expressions
* assignment
* input/output commands
* the flow control of sequence and constructs of selection and iteration.
* review and use basic data structures (strings, numbers, Booleans, and arrays)
* test your code
* execute test cases to identify logic errors
* comment as you code, explaining your decisions with block comments.

Assessment Conditions

Prepare a digital solution or prototype with accompanying screen capture validation. Your digital solution should be no more than 1 GB. Present your digital solution to the class in oral or multimodal form. Your presentation should be no more than 5 minutes. Your solution must transform data into information using a digital system. If you present a prototype, there should enough programming present to clearly explain how the solution will produce an output.

You should provide individual evidence of your role in and contribution to the task using web-based software.

The screen capture validation should provide evidence of:

* the computational thinking concepts and techniques you used to identify and deconstruct the problem
* your use of abstraction to identify core concepts and ideas
* your application of skills and processes to develop solutions to problems of interest
* your initiative in the design and creation of digital solutions
* an evaluation of the effectiveness of a digital solution or prototype
* an explanation, with supporting evidence, of your role in and contribution to the task.

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Stage 2 Digital Technologies

Assessment Type 1: Project Skills Task 4

*Project* *development task*

Assessment Description

This task should be completed in conjunction with Project Skills Task 3: Design and programming skills.

Evaluate your application of the iterative development process you used in the design and programming task. Here is an example of a possible iterative approach to design and programming.



Source: www.tutorialspoint.com. (2016). *SDLC - Iterative Model*. [online]: http://www.tutorialspoint.com/sdlc/sdlc\_iterative\_model.htm

In this approach, the development starts by specifying and implementing only part of the solution, which is then reviewed in order to identify further requirements. This process is then repeated to produce a new version of the solution at the end of each iteration.

The following is an example of a more linear model of development:



Source: Science Buddies. (2016). *The Engineering Design Process*. [online]: http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml#theengineeringdesignprocess

Evaluate the method that you used to develop your digital solution in the design and programming task, and:

* outline the merits of each of the design models above
* explain how you developed your own digital solution
* evaluate the design approach that you used in the design and programming task, commenting on:
* the effectiveness of the design approach that you used, including its advantages and disadvantages
* the time taken to develop your solution
* ways in which the design approach could be improved.

Assessment Conditions

Present your findings in a multimodal presentation of no more than 5 minutes. The presentation should provide evidence of:

* your application of iterative development, testing, modification, and documentation of a digital solution.

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