# Computing Technology Stage 5 (Year 10) – sample assessment task 1 notification

**Software development** **– creating games and simulations**



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## Task description

**Type of task**:creating games and simulations research task and prototype

**Outcomes being assessed**:

A student:

* understands how innovation, enterprise and automation have inspired the evolution of computing technology **CT5-EVL-01**
* applies computational, design and systems thinking to the development of computing solutions **CT5-THI-01**

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**Suggested weighting**:15%

Students will research the game *Pac-Man* and investigate its structure and impact on society, communicating their findings through a presentation. Students will create a user interface design for an arcade style game considering the inputs and outputs, including a menu screen and playable area.

Students are to discuss the history of the *Pac-Man* game, created in the 1980s and its impact on the game industry at the time of release. Understanding *Pac-Man* gives the opportunity to look at mazes and data structure, and control structures to navigate and score.

Students demonstrate an understanding of the hardware available at the time and how its limitations affected the processing involved in the ghosts.

Students will then discuss links between these early games and our current gaming environment.

## Submission details

Students can submit their work digitally.

## Steps to success

Table 1 – assessment preparation schedule

|  |  |
| --- | --- |
| Steps | What I need to do/when I need to do it |
| Compare old hardware to currentExplore how the changing needs of society have influenced the development of games and simulations, including the impact of simulations and games on a range of industries. | * Produce a presentation outlining the differences between hardware from the 1980s and now and how it has affected games available then to now.
* Elaborate on how this has affected the general audience for games over time.
* Specify the non-functional requirements of a game or simulation.
* Examples include
* age suitability
* motivation or immersion
* visual appeal of a game world.
 |
| Understand Ghost Artificial Intelligence (AI) | * Using flowcharts, explain the logic that the 4 ghosts in *Pac-Man* followed.
 |
| Discuss the AI effect | * Write a brief report outlining how these predefined algorithms created a simple AI and the resulting experience for the player.
 |
| Elements of an arcade style game | * Discuss the elements that make up an arcade style game and how the elements have been implemented into *Pac-Man*.
* Some examples include
* core gameplay loop
* levels
* self-contained progression
* simple controls
* lives
* high score tracking
* over the top gameplay
* increasing difficulty.
 |
| Graphical User Interface (GUI) screen designs | * Provide 3 different screen designs for an arcade style game. The screen designs must include a menu screen and game area.
 |

## What is the teacher looking for?

The teacher is looking for a demonstration of understanding on how the tools available to game designers have changed over time, and how the games offered have also changed as a result.

The teacher is looking for an appreciation of how creativity can overcome limitations when designing games and provide engaging experiences. Overcoming limitations is outlined and then utilised in the production of screen designs for your own game.

## Marking guidelines

Table 2 – assessment marking guidelines

|  |  |
| --- | --- |
| Grade | Marking guideline descriptors |
| A | * The student demonstrates an extensive understanding of how hardware and software impact the ability of a product to fulfil the needs of users.
* The student skilfully applies appropriate processes to outline the logic controlling the ghosts through flowcharts.
* The student develops highly effective screen designs using computational, design and systems thinking skills for the arcade game.
* The student selects relevant data, media and processes to effectively communicate information in a range of contexts.
 |
| B | * The student demonstrates a thorough understanding of how hardware and software impact the ability of a product to fulfil the needs of users.
* The student applies appropriate processes to outline the logic controlling the ghosts through flowcharts.
* The student develops effective screen designs using computational, design and systems thinking skills for the arcade game.
* The student selects relevant data, media and processes to communicate appropriate information in a range of contexts.
 |
| C | * The student demonstrates an understanding of how hardware and software impact the ability of a product to fulfil the needs of users.
* The student applies processes to outline the logic controlling the ghosts.
* The student develops screen designs using computational, design and/or systems thinking skills.
* The student selects appropriate data, media and processes to communicate information in a range of contexts.
 |
| D | * The student demonstrates a basic understanding of how hardware and software impact the ability of a product to fulfil the needs of users.
* The student implements basic processes to outline the logic controlling the ghosts.
* The student implements basic elements screen designs using computational, design and/or systems thinking skills.
* The student uses data to communicate basic information.
 |
| E | * The student identifies features of hardware and software that impact the experience of the user.
* The student identifies some characteristics of the logic controlling the ghosts.
* The student implements very basic elements screen designs using computational, design and/or systems thinking skills.
* The student uses data to communicate information in a very limited way.
 |

## Student-facing rubric

Table 3 – rubric for assessment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Criteria | Limited | Basic | Sound | High | Outstanding |
| Comparison of technology and software and its impact on user experience | An attempt is made to identify characteristics of hardware and software with some relation to the user interface. | The student provides a basic comparison that identifies hardware available in the past and identifies characteristics of games from then and now. | The student outlines the differences between modern and past hardware with sound analysis of how the games have changed and its impacts on audiences. | The student provides a good discussion of the differences between hardware from past and present with solid analysis of its impact on games and the audience.  | The student’s comparison of hardware and software from 2 distinct time periods is outlined extensively and clearly discusses their effects on the user experience. The comparison is well written and engaging. |
| Explanation of Ghost AI | The student identifies characteristics of the logic of the ghosts. There is an attempt to express the logic by way of flowcharts. | The student describes the Ghost AI that identifies characteristics of their behaviour with some mention of the capabilities of the hardware and software. | The student explains the Ghost AI with a sound outline of their behaviour. Some ideas are presented for how modern technology would impact their capabilities. | The student creates a solid discussion of the behaviour of the Ghost AI and how modern technology would impact their capabilities. | The student’s explanation of the Ghost AI is thorough and expressed in a highly efficient manner. Well-thought-out ideas are presented for how the Ghost AI would be impacted by modern technology. |
| Elements of an arcade style game | The student identifies elements of an arcade game which are discussed with an attempt to demonstrate how elements are present in *Pac-Man*. | The student identifies correct elements of an arcade game which are discussed with a demonstration of how elements are present in *Pac-Man*. | The student explains elements that make up an arcade-style game. They present, with some links, how the elements have been implemented into *Pac-Man*. | The student explains elements that make up an arcade-style game. They demonstrate clear links to how the elements have been implemented into *Pac-Man*. | The student discusses elements that make up an arcade-style game which is thorough and shows depth of understanding. They demonstrate clear links to how the elements have been implemented into *Pac-Man*. |
| Development screen designs | The student produces screen designs that have the intention of a UI. | The student produces screen designs that link to the idea of a UI. | The student produces screen designs that show how the UI for the game can be presented. | The student produces screen designs that offer a varied set of ideas, showing thought into the needs of the player. | The student produces screen designs that consider the needs and goals of the player and present a broad and creative set of ideas for how the UI could be implemented. |

## Student support material

**Resources include**:

* Teacher resource with scaffolds, templates and graphic organisers for completing the task
* Teacher resource with additional information to support student understanding
* Program of learning.

This assessment is also an opportunity to show and reference other platforms that use *Pac-Man*-style games:

* [Pac-Man | Microsoft MakeCode: micro:bit](https://makecode.microbit.org/49267-32984-89340-13451)
* [Minecraft Computer Science Kit | Minecraft Education](https://education.minecraft.net/en-us/resources/computer-science-subject-kit)
* [Maze Runner 2D | Invent with Python](https://inventwithpython.com/bigbookpython/project44.html).

Additionally, the teacher could provide students with the [Pacman Ghost Algorithm](https://www.101computing.net/pacman-ghost-algorithm/) to turn into a flowchart.

## Additional information

This resource has been developed to assist teachers in NSW Department of Education schools to create learning that is contextualised to their classroom. It can be used as a basis for the teacher’s own program, assessment, or scope and sequence, or be used as an example of how the new curriculum could be implemented. The resource should be used with timeframes that are created by the teacher to meet the overall schedules of assessment.

For additional support or advice, contact the TAS curriculum team by emailing TAS@det.nsw.edu.au.

### Assessment advice

Assessment is a powerful tool to measure student learning and plan for the next stages in the learning process. Some considerations in using parts of this assessment notification are:

* Consider the skills, knowledge, and understanding students need to complete the task, and see where there are opportunities for them to refine these through ongoing feedback in the learning sequences associated with the assessment task.
* Ensure the language and readability of the task presents an appropriate challenge for the students the task is being used with. Direct, plain English will allow the greatest number of students to access the task independently.
* Marking guidelines should directly reflect the success criteria and outcomes of the task and align with appropriate levels of achievement for the relevant stage.
* When constructing or adjusting the marking guidelines and/or rubric, try to keep active verbs like ‘do’, ‘say’, ‘make’, or ‘write’ in mind to measure student performance at each level. This will help to avoid subjective language.

### Assessment as a learning opportunity

Assessment can provide ways for students to use formal and informal feedback and self-assessment to help them understand where they are in their learning, where they are going, and how they are going to get there. It is essential that students receive feedback on their performance in the task and have opportunity to clarify and plan the next steps in learning.

* Clear and explicit marking rubrics can support effective self-assessment in relation to the learning intentions and success criteria assisting students to become owners of their own learning. Students can then build their capacity for individual goal setting, which includes students asking questions such as, ‘What do I need to improve?’ and ‘What is my next step?’ ([CESE Growth goals setting – what works best in practice](https://education.nsw.gov.au/about-us/educational-data/cese/publications/practical-guides-for-educators/growth-goal-setting)).
* Greater learning gains may be made when teachers provide explicit descriptive feedback to students in a timely manner. This feedback supports students in forming their learning goals as well as helping the teacher to plan for the next iteration of the teaching and learning cycle.

#### Differentiation advice

Differentiated learning can be enabled by differentiating the assessment approach to content, process and product. Reasonable adjustments of assessment for students with disability is a legal requirement under the [*Disability Standards for Education 2005* (Cth)](https://www.dese.gov.au/disability-standards-education-2005). For students with a disability, adjustment in assessment tasks should be made through the [Collaborative curriculum planning](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/diversity-in-learning/special-education/collaborative-curriculum-planning) process. For more information on differentiation, go to [Differentiating learning](https://education.nsw.gov.au/teaching-and-learning/professional-learning/teacher-quality-and-accreditation/strong-start-great-teachers/refining-practice/differentiating-learning) and [Differentiation](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/primary-school/teaching-strategies/differentiation). When using this resource, teachers can use a range of [adjustments](https://education.nsw.gov.au/teaching-and-learning/disability-learning-and-support/personalised-support-for-learning/adjustments-to-teaching-and-learning) to ensure a personalised approach to student learning.

* Some common adjustments are available through the [Inclusive Practice hub assessment and reporting](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/all-resources/secondary-resources/other-pdf-resources/nesa-assessment-and-reporting) site.
* The [HPGE Differentiation Adjustment Tool](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/implement/differentiation-adjustment-strategies) and [Differentiation Package](https://schoolsnsw.sharepoint.com/sites/HPGEHub/SitePages/Home.aspx#first-time-access-to-hpge-resources) can assist teachers to decide how to provide extension and additional challenge for High Potential and Gifted (HPG) students.

The steps below may be useful to consider when creating access opportunities for all students:

* remove unnecessary words or images
* simplify any tricky words or make a glossary of subject-specific words
* reduce the lexical density of the steps and use student-friendly language
* chunk large passages of reading or offer alternate ways of representing the information, such as a visual
* make the task description a checklist with numbered steps
* limit options and/or reduce the number of choices students need to make independently.

### Support and alignment

**Resource evaluation and support**: all curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance and effectiveness. For additional support or advice contact the TAS curriculum team by emailing TAS@det.nsw.edu.au.

**Alignment to system priorities and/or needs**: [School Excellence Policy](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468), [School Success Model.](https://education.nsw.gov.au/public-schools/school-success-model/school-success-model-explained)

**Alignment to the School Excellence Framework**: this resource supports the [School Excellence Framework](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468) element of assessment (formative assessment, summative assessment, student engagement).

**Alignment to Australian Professional Teaching Standards**: this resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 5.1.2, 5.4.2.

**Consulted with**: Curriculum and Reform and subject matter experts

**NSW Syllabus**: Computing Technology 7–10

**Syllabus outcomes**: CT5-EVL-01, CT5-THI-01.

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**Related resources**: further resources to support Computing Technology Stage 5 can be found on the [TAS curriculum page](https://education.nsw.gov.au/teaching-and-learning/curriculum/tas).

**Professional learning**: relevant professional learning is available through the TAS statewide staffroom.

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## Evidence base

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