2

NZQA
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MANA TOHU MĀTAURANGA O AOTEAROA

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COMMON ASSESSMENT TASK

Level 2 Digital Technologies and Hangarau Matihiko, 2021

91898 Demonstrate understanding of a computer science concept

Credits: Three

Achievement Criteria		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Demonstrate understanding of a computer science concept.	Demonstrate in-depth understanding of a computer science concept.	Demonstrate comprehensive understanding of a computer science concept.

Type your School Code and 9-digit National Student Number (NSN) into the space below. (If your NSN has 10 digits, omit the leading zero.) It should look like "123-123456789-91898".

SchoolCode-YourNSN-91898

There are three questions in this document. **Choose ONE question to answer.**

You should aim to write between **800–1500 words** in total.

Your answers should be presented in 12pt Times New Roman font, within the expanding text boxes, and may include only information you produce during this assessment session. Internet access is not permitted.

Save your finished work as a PDF file as instructed by your teacher.

By saving your work at the end of the examination, you are declaring that this work is your own. NZQA may sample your work to ensure that this is the case.

INSTRUCTIONS

There are three questions in this assessment, on the topics of:

- Computer security (page 3)
- Encryption (page 8)
- Error control (page 13).

Choose only ONE question to answer. Note that parts (b), (c), and (d) of the question include options for you to choose from.

Read all parts of your chosen question before you begin.

EITHER: **QUESTION ONE: Computer security**

(a) (i) Name a **specific** New Zealand-based company or organisation that uses computer security.
Note: If you want to discuss your school, state "My school".

(ii) Give at least TWO examples of ways computer security is used by this organisation.

(iii) What do these uses of computer security enable this organisation to do that would otherwise be difficult or impossible?

(b) Choose TWO of the following to answer:

- In what ways do firewalls protect an individual user's computer?
- What methods do hackers use to get malware onto an individual user's computer?
- Users are advised to regularly update their operating systems and applications. How does this improve protection against malware for an individual user's computer?

Choice (1) – (copy and paste below)

Response

Choice (2) – (copy and paste below)

Response

(c) Choose ONE of the following to answer:

- What are some ways that computer security can be future-proofed?
- What are some ways that human factors influence decisions about computer security?

You should consider this question in the context of the organisation you wrote about in part (a).

Choice (copy and paste below)

Response

(d) Choose ONE of the following to answer:

- An organisation needs to ensure several different types of “updates” are used to keep its network of computers and servers secure. What are some of the challenges these updates pose for an organisation, and how might it deal with them?
- If a computer is infected by malware, what issues might this cause, and what steps could an individual or organisation take to resolve the issues?

You should consider this question in the context of the organisation you wrote about in part (a).

Choice (copy and paste below)

Response

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OR: **QUESTION TWO: Encryption**

(a) (i) Name a **specific** New Zealand-based company or organisation that uses encryption.
Note: If you want to discuss your school, state "My school".

(ii) Give at least TWO examples of ways encryption is used by this organisation.

(iii) What do these uses of encryption enable this organisation to do that would otherwise be difficult or impossible?

(b) Choose TWO of the following to answer:

- How do private and public keys work in public-key encryption?
- What are the concerns if a website user clicks on “I forgot my password” and the website emails them their original password?
- What different encryption procedures can an organisation use to ensure the security of its customers’ accounts?

Choice (1) – (copy and paste below)

Response

Choice (2) – (copy and paste below)

Response

(c) Choose ONE of the following to answer:

- What are some ways that encryption can be future-proofed?
- What are some ways that human factors influence decisions about encryption?

You should consider this question in the context of the organisation you wrote about in part (a).

Choice (copy and paste below)

Response

(d) Choose ONE of the following to answer:

- A person is using public Wi-Fi in a café. They plan to set up a new social media account and then log in to it. Explain how the encryption process works, including any key problems or issues.
- Assuming usable quantum computers become a reality, what problems is this likely to cause with data that has already been encrypted, and with data that needs to be newly encrypted. (It may help to create a possible timeline showing quantum computers becoming available to different organisations and individuals.)

If relevant, you should consider this question in the context of the organisation you wrote about in part (a).

Choice (copy and paste below)

Response

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OR: **QUESTION THREE: Error control**

(a) (i) Name a **specific** New Zealand-based company or organisation that uses error control.
Note: If you want to discuss your school, state "My school".

(ii) Give at least TWO examples of ways error control is used by this organisation.

(iii) What do these uses of error control enable this organisation to do that would otherwise be difficult or impossible?

(b) Choose TWO of the following to answer:

- Name a type of barcode, and the algorithm(s) involved in its error control. What is the purpose of using these algorithm(s)?
- How does “automatic repeat request” (ARQ) error control work in network traffic?
- How is redundant data used in error control?

Choice (1) – (copy and paste below)

Response

Choice (2) – (copy and paste below)

Response

(c) Choose ONE of the following to answer:

- What are some ways that error control can be future-proofed?
- What are some ways that human factors influence decisions about error control?

You should consider this question in the context of the organisation you wrote about in part (a).

Choice (copy and paste below)

Response

(d) Choose ONE of the following to answer:

- QR codes use Reed-Solomon codes for error control. How does this differ from the method of error control used in barcodes? What are the advantages and limitations of each method? *Note: You are not required to explain how Reed-Solomon code works.*
- Network traffic on the internet involves the transfer of large amounts of data. Explain the key problems and issues with the transfer of data, and how error control helps to solve these.

If relevant, you should consider this question in the context of the organisation you wrote about in part (a).

Choice (copy and paste below)

Response