

91887 SESSION B, 16–20 OCTOBER



Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

COMMON ASSESSMENT TASK

Level 1 Digital Technologies 2023

91887 Demonstrate understanding of compression coding for a chosen media type

Credits: Three

| Achievement | Achievement with Merit | Achievement with Excellence |
|--|---|--|
| Demonstrate understanding of compression coding for a chosen media type. | Demonstrate in-depth understanding of compression coding for a chosen media type. | Demonstrate comprehensive understanding of compression coding for a chosen media type. |

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 “123–123456789–91887”.

SchoolCode-YourNSN-91887

Answer parts (a), (b), and (c), and then choose ONE of parts (d), (e), or (f).

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

Your answers should be presented in 10pt Verdana 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 with the file name used in the header at the top of this page (“SchoolCode-YourNSN-91887.pdf”).

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

INSTRUCTIONS

The assessment task requires you to discuss compression methods for one or more media types (image, video, or audio).

You must answer parts (a), (b), and (c).

Choose only ONE of parts (d), (e), or (f) on lossless compression:

- (d) Huffman coding
- (e) Run-length encoding
- (f) LZW.

You may copy and paste relevant information from the following resources to support your answers.

Read all parts of the assessment task before you begin.

RESOURCE A: Images



Fig. 1

RESOURCE B: Audio



Fig. 2

RESOURCE C: Video



Fig. 3

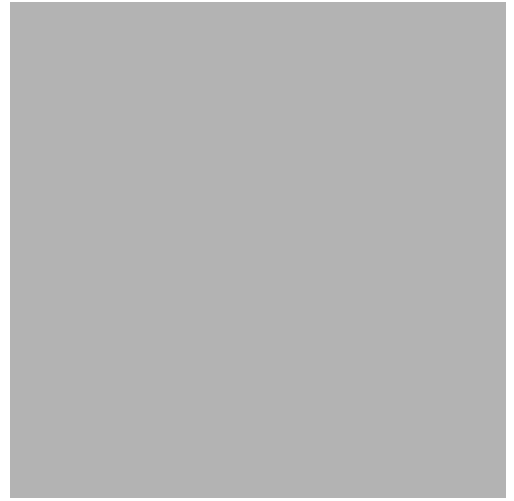


Fig. 4

Acknowledgements

Material from the following sources has been adapted for use in this assessment:

[https://k12.libretexts.org/Bookshelves/Photography/Book:_Digital_Photography_Basics_\(Poltzer\)/02:_Your_Digital_Camera/2.05:_Resolution_and_Compression](https://k12.libretexts.org/Bookshelves/Photography/Book:_Digital_Photography_Basics_(Poltzer)/02:_Your_Digital_Camera/2.05:_Resolution_and_Compression)

<https://boomspeaker.com/320kbps-vs-flac/>

<https://aws.amazon.com/blogs/media/part-1-back-to-basics-gops-explained/>

ASSESSMENT TASK

- (a) Referring to ONE media type (image, video, or audio), explain at least TWO advantages of compressing files of this media type.

Media type:

(b) (i) Give an example of a time when you have personally used lossy compression.

(ii) Give an example of a time when you have personally used lossless compression.

(iii) Why was it appropriate to use this compression method in these cases? Justify your answer.

SCENARIO: Building a website

Students are working in groups in their computer science class to produce an educational website for one of their subjects to help their peers with their exam preparation. As well as text content, the website will incorporate multimedia elements such as images, audio, and video, ensuring that all learning needs are met and that the resource they are creating will be beneficial to a wide range of learners.

- (c) Consider the scenario above. You may also include screenshots from **Resources A, B, and C** on pages 2 and 3.

Select ONE of the media types (images, video, or audio) to advise on. You may select the same media type as you discussed in part (a).

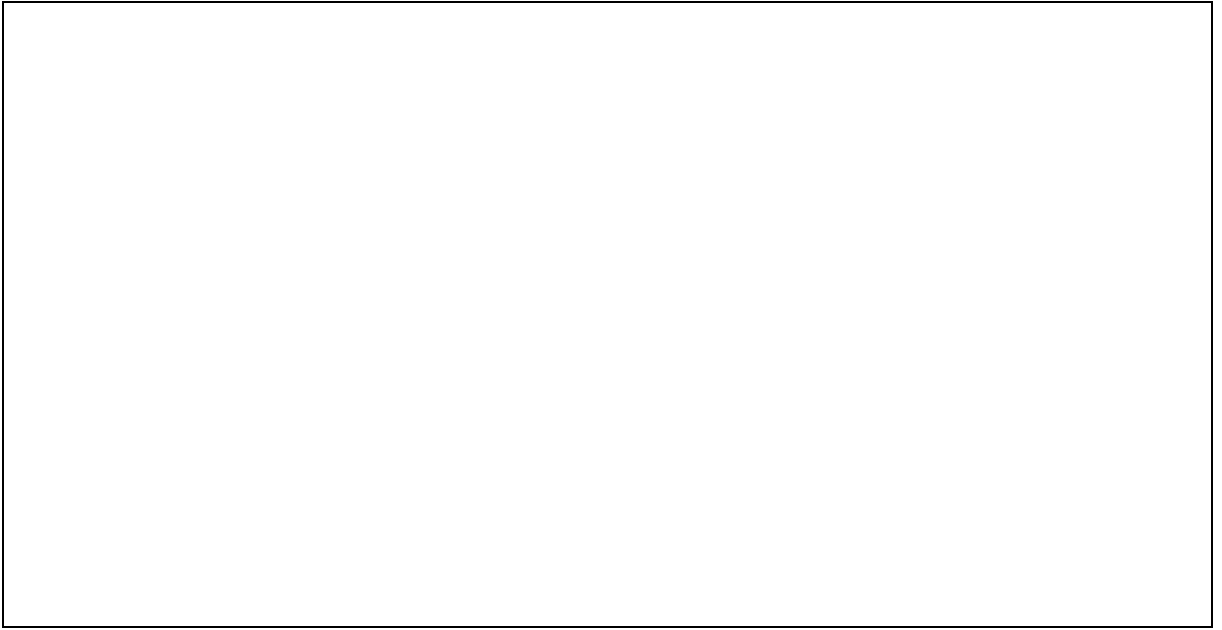
Media type:

- (i) Which of the following is the most appropriate compression method for your chosen media type in the scenario provided?
- lossy compression for all files
 - lossless compression for all files
 - a combination of both lossy and lossless compression.

Choice (copy and paste below)

- (ii) Explain how your suggested approach would affect the output from the end user's perspective.

- (iii) Justify why your suggested approach is the most suitable solution by comparing and contrasting it with another approach.

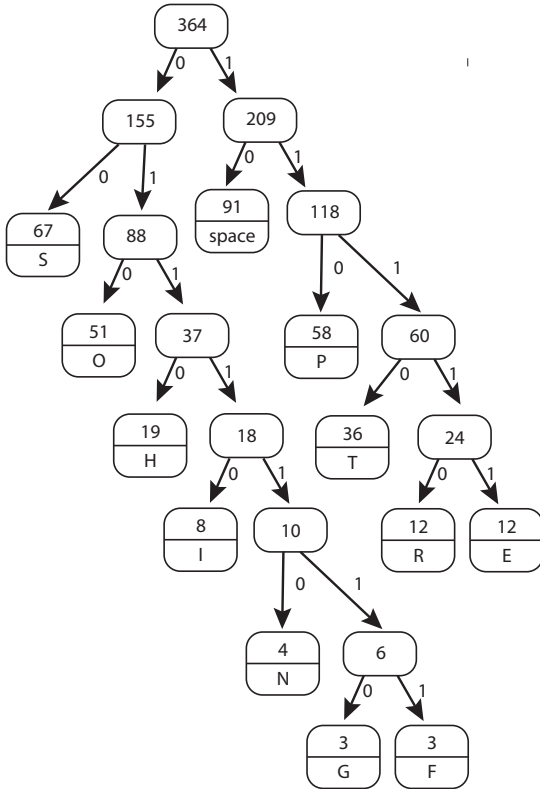


Lossless compression

Answer EITHER part (d) Huffman coding OR part (e) Run-length encoding OR part (f) LZW.

(d) Huffman coding

Note: If you are answering this part, don't answer parts (e) or (f).



(i) Using the Huffman tree above, decode the code 00 0110 010 11110 11111

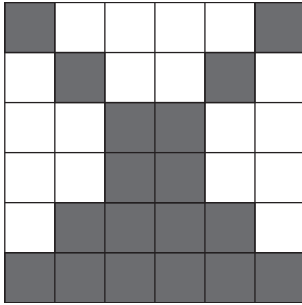
(ii) Using the Huffman tree above, encode the word FORGE

(iii) If the phrases OFFSPRING PROFITING OFF FISH and POSH TROOPS POSE FOR PHOTOS are encoded with the Huffman tree above, which phrase will be compressed by more? Justify your answer.

(e) **Run-length encoding**

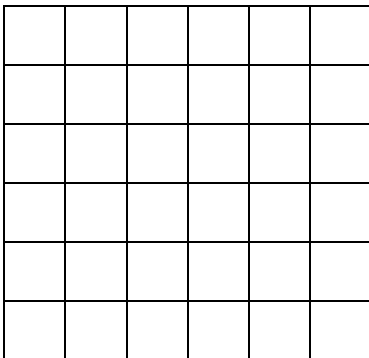
Note: If you are answering this part, don't answer parts (d) or (f).

(i) Encode this 6×6 image using run-length encoding.

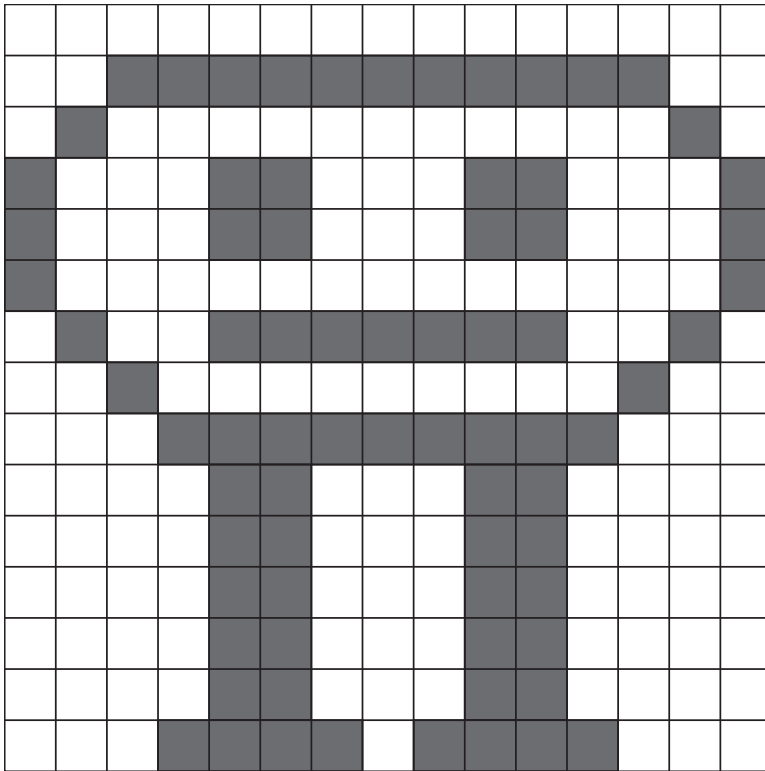


(ii) Decode the code below by filling in any 'black' boxes with a cross (X).

0, 6
 2, 2, 2
 6
 2, 2, 2
 1, 1, 2, 1, 1
 0, 2, 2, 2



- (iii) Consider the 15×15 image below. Will the file result in a smaller or larger file size when compressed using run-length encoding? Justify your answer.



Empty rectangular box for the answer.

(f) **LZW**

Note: If you are answering this part, don't answer parts (d) or (e).

| Code | Character string | Code | Character string |
|------|------------------|------|------------------|
| 0 | The | 5 | and |
| 1 | wheels | 6 | wipers |
| 2 | on the bus | 7 | swish |
| 3 | go | 8 | all day long |
| 4 | round | 9 | , |

(i) Use the dictionary above to encode the following song lyrics.

The wheels on the bus go round and round,
 round and round, round and round
 The wheels on the bus go round and round, all day long

(ii) Use the dictionary above to decode the following code.

0 4 1 2 3 7 8

(iii) How could the dictionary above be changed to improve the compression of the following song lyrics? Justify your answer.

The wheels on the bus go round and round, round and round, round and round
 The wheels on the bus go round and round, all day long
 The wipers on the bus go swish swish swish, swish swish swish, swish swish swish
 The wipers on the bus go swish swish swish, all day long