Assessment Schedule – 2022

Digital Technologies: Demonstrate understanding of compression coding for a chosen media type (91887)

Assessment Criteria

Achievement	Achievement with Merit	Achievement with Excellence
*Demonstrating **understanding** of compression coding for a chosen media type* involves: • identifying reasons for compressing files • showing how the chosen media type can be represented using bits in an uncompressed form • showing how a lossless compression method works • giving examples of when lossy compression is appropriate.	*Demonstrating **in-depth understanding** of compression coding for a chosen media type* involves: • exploring the relationship between lossy compression and human perception of the medium • evaluating lossy and lossless compression methods.	*Demonstrating **comprehensive understanding** of compression coding for a chosen media type* involves: • evaluating how real-world applications are enabled by relevant representations including lossy, lossless, compressed or uncompressed.

Evidence

N1	N2	A3	A4	M5	M6	E7	E8
Demonstrates very little understanding.	Report is produced by the candidate but demonstrates little understanding and part of the response may be missing.	For the chosen media type, demonstrates understanding of reasons to compress, identifies when they have used compression, and how lossless compression works. Some descriptions may be weak or partial.	For the chosen media type, demonstrates clear understanding of reasons to compress, identifies when they have used compression, and how lossless compression works.	Evaluates as required to show in-depth understanding of the relationship between lossy and lossless compression and how this affects human perception. Some descriptions may be weak or partial.	Evaluates as required to clearly show in-depth understanding of the relationship between lossy and lossless compression and how this affects human perception.	Demonstrates a comprehensive understanding of real-world applications of compression in the context of the selected media type for a specific output. Some aspects may be partial or weak.	Clearly demonstrates comprehensive understanding of real-world applications of compression in the context of the selected media type for a specific output.

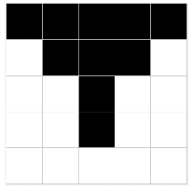
N0 = No response; no relevant evidence.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 2	3 – 4	5 – 6	7 – 8

Question	Achievement	Achievement with Merit	Achievement with Excellence
	Requires 2 out of 3 of (a), (b) and (c), and either (d)(i), (d)(ii), (e)(i), (e)(ii), (f)(i), or (f)(ii).	Requires 2 out of 3 of (b), all components of (c), and either (d)(iii) or (e)(iii) or (f)(iii).	Requires at least one of (b) and (c) to be strong, or understanding demonstrated across the two questions.
(a)	Student gives reasons why files of their chosen media type might be compressed. *Example: Files should be compressed so that they take up less space. This means people can fit more files on their computers or phones and not run out of room.*		
(b)	Student identifies times when they have used lossy or lossless compression. Justification is weak. *Example: I use lossy compression when taking photos on my phone. This means it takes up less space and I can send them to people without using up all of my data.*	Student identifies times they have used lossy or lossless compression AND explains clearly why it was appropriate to use in those cases. They could refer to the impact on the user, such as loading times or image quality. *Example: I use lossy compression when taking photos on my phone. JPG is the default file type because it takes up less space, and it means I can store more photos on my phone and upload them to Instagram or send them to friends faster. Because lossy compression removes data, images will decrease in quality if they are over-compressed, leading to degradation such as artefacts or colour banding. However, an advantage of JPG is that it can be set to compress at different rates, meaning you can reduce the file size without affecting quality too much, which is important if you are going to be sharing images. Because phone screens are small, most people will prioritise speed over quality, and lossy compression such as JPG compresses files by a lot, meaning they will be faster to send.*	Student identifies times they have used lossy or lossless compression, explains clearly why it was appropriate to use, AND contrasts this against other methods. Their answer clearly relates to the real world. *Example: If the photos were uncompressed, the files would be huge and it would take too long to upload or share them. Another way of compressing is lossless. This does not compress files as much because it doesn't remove any data like lossy, it just represents the information in a different way. The files can even become larger than the original uncompressed images in some cases. Given I am sharing images from my phone with friends who are going to be viewing them on their phones too, it is important that the images are made smaller so that they load quickly and we don't use up all of our data. JPG is a great way of doing this as it can compress the file size a lot without affecting quality too much.*

(c)	Student selects one of the media types and recommends a transmission method to the principal. They identify a compression method. Their answer will include some aspects of how this method would affect the output from the end user's perspective, but may be weak or partial. *Example: I chose images. The principal should store the image files on the school's server and email a download link to the community. I would recommend that they use lossy compression as they could use JPG. This will make the images smaller so they download faster on the patchy rural internet connection. As long as they are not over-compressed, the images will still look okay so families can see their children performing.*	Student selects one of the media types and recommends a transmission method to the principal. They identify the most appropriate compression method. Their answer will include how this method would affect the output from the end user's perspective. *Example: I chose images. The principal should store the image files on the school's server and email a download link to the community. This is better than emailing as many email services have size limits on attachments. I would recommend that they use lossy compression for the images as they could use JPG. This is great because you can choose different levels of compression, ensuring that you can reduce the file size without decreasing image quality too much. JPG works by approximating the original image and permanently reducing the quality. If an image is over-compressed it can result in artefacts or colour banding, which make the image look terrible. While families would be happy with a faster download speed, particularly on their patchy internet access, it isn't worth it if the image quality is too poor. So the principal should use the lossy compression method JPG, and make sure images are not over-compressed.*	Student selects one of the media types and recommends a transmission method to the principal. They identify the most appropriate compression method. Their answer will include how this method would affect the output from the end user's perspective AND they explain why this method is better than another compression method. *Example: I chose images. The principal should store the image files on the school's server and email a download link to the community. I would recommend that they use lossy compression for the images as well, as formats like JPG enable you to significantly reduce file size without compromising quality too much. This is done through techniques like DCT or the use of basis functions to approximate the image. It is important that images are not over-compressed as this can result in artefacts or colour banding, which would ruin the quality and upset families. Lossy compression is a better option than lossless in this situation as with patchy internet access it is important that file sizes are as small as possible without ruining the quality. Lossless, while maintaining high quality, does not reduce the file size as much as it doesn't remove content, only representing it in a different way. Similarly, uncompressed images are far too big to be reliably transmitted on the school's internet connection.*

(d)	(i) and (ii) Student is able to use a lossless compression method to encode and / or decode content. *Decodes the message as:* *MUCK.* *Encodes DAME as:* *101 1110 1100 0*	(iii) Student demonstrates deeper understanding of how a lossless compression method works. *Example: The phrase 'A muddled meal' will be compressed by more as it has more characters near the top of the Huffman tree. This means each will require fewer bits to represent them. This is because in the text used to generate the Huffman tree, letters such as E, D and L were more common.*	
(e)	(i) and (ii) Student is able to use a lossless compression method to encode and / or decode content. *Encodes the image as:* *5* *1,1,1,1,1* *0,1,3,1* *1,3,1* *Decodes the image as:* 	(iii) Student demonstrates deeper understanding of how a lossless compression method works. *Example: Image B will result in a larger file size than the original. This is because it has fewer long runs of one colour, and changes back and forth between black and white constantly.*	
(f)	(i) and (ii) Student is able to use a lossless compression method to encode and / or decode content. *Encodes the lyrics as* *0 1 2* *0 3 5 7 1 8 1 2 4* *0 3 5 7 1 8 1 2 4* *6 7 1 8 1 2* *0* *Decodes the message as:* *Just drift away. Day dreaming, so sweet, yeah.*	(iii) Student demonstrates deeper understanding of how a lossless compression method works. *Example: Adding the whole line 'Just drift away (day dreaming, so sweet, yeah) to the dictionary would save space as it could then be represented with the number 10 instead.* *Or, adding (day dreaming, so sweet, yeah) to the dictionary, as it could then be represented with the number 10 instead. This adds less size to the dictionary but saves a lot on the compressed message.*	