Chhetri Academy

chhetriacademy.com

GCSE COMPUTER SCIENCE

1.2

OCR J277 | Specification point 1.2.5

Compression

Untiered

Past paper question booklet

4	2015-2023	Untiered
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

2 The website of a school allows visitors to download JPG, MP3, MPEG and PDF files.

(a) The table below describes the content of four files that can be downloaded from the website.

Complete the table using the file types above, identifying the **most suitable** file type for each item. You may use a file type more than once if appropriate.

Content	Type of file
An image showing a map of the school	
A text document containing information for parents about the school rules	
A high resolution picture of all the staff and pupils	
A short video clip of some pupils saying why they like the school	

[4]

(b) The video clip is compressed using lossy compression.

Explain why lossy compression is suitable for a video clip, but not suitable for a text document.

.....

.....

.....

.....

.....

.....

.....

.....

..... **[3]**

1 **(a)** A radio station records an interview with a computer scientist using a computer and audio recording software.

(i) Explain how sampling is used to store audio recordings.

.....

.....

.....

.....

.....

.....

.....

..... **[2]**

A second interview with the computer scientist is recorded. Before this interview, the sampling frequency in the audio software is increased.

(ii) Define what is meant by the term **sampling frequency**.

.....

.....

.....

.....

..... **[1]**

© OCR 2019

(iii) Tick (✓) **two** boxes to show the effects of increasing the sampling frequency.

Data type of returned value	Tick (✓) **two** boxes
The file size of the digital recording will be smaller.	
The file size of the digital recording will be larger.	
The quality of playback of the digital recording will be better.	
The quality of playback of the digital recording will be worse.	

[2]

(b) The radio station uses a digital camera to take a photograph of the computer scientist for their website. The photograph is stored as a bitmap image.

(i) Describe how bitmap images are represented in binary.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[3]**

(ii) Explain why computers represent data in binary form.

.....

.....

.....

.....

.....

..... **[2]**

The image is compressed using lossy compression before being uploaded to the radio station's web server. The image will be used on the radio station's website.

(iii) Describe **one** advantage and **one** disadvantage of using lossy compression on the image that will be used on the website.

Advantage .....

.....

.....

.....

.....

Disadvantage .....

.....

.....

.....

.....

[4]

© OCR 2019

6 A student is creating a range of documents for a school project.

(a) The student records a podcast about computer science.

(i) Describe how an analogue sound wave is converted into digital form.

.....

.....

.....

.....

.....

..... **[3]**

(ii) Tick (✓) **one or more** boxes on each row to identify the effect(s) that each change will have on the sound file.

Change	File size increases	File size decreases	Accuracy increases	Accuracy decreases
Duration changes from 10 minutes to 20 minutes				
Sample rate changes from 44 kilohertz to 8 kilohertz				
Bit depth changes from 8 bits to 16 bits				

[3]

(b) The student writes a report about volcanoes.

(i) The computer stores text using the ASCII character set.

Part of the ASCII character set is shown:

Character	ASCII denary code
M	77
N	78
O	79
P	80
Q	81

Identify the character that will be represented by the ASCII denary code 84.

..... **[1]**

© OCR 2022

(ii) Identify a second character set.

..... **[1]**

(c) The student takes a photograph of their science experiment. The image file includes metadata.

Identify **three** pieces of metadata that is often stored with an image.

1 .....

2 .....

3 .....

[3]

(d) The student compresses all their documents before emailing them to their teacher.

(i) Give **two** benefits of compressing the data before it is emailed.

1 .....

.....

2 .....

.....

[2]

(ii) Explain why lossy compression may **not** be appropriate to compress all of the student's files.

.....

.....

.....

..... **[2]**

3 Binary numbers can represent different forms of data.

(a) One form of data is characters.

Complete the description of how computers represent characters in binary using the given list of terms. Not all terms will be used.

2	4	8	9	16	32	256	
71	72	74	76	78	80	81	
all	different	identical	one	repeated	similar	some	unique

A character set stores ..... of the characters that the computer can represent. Each character is given a ..... binary code. Lower-case and upper-case letters in a character set are given ..... binary codes.

One example of a character set is ASCII. This character set uses ..... bits for each character. If the code value for the character 'F' is 70 then the code value for the character 'L' is ..... .

[5]

(b) Binary numbers can also represent images.

The table shows the colours that are used in an image and the binary value for each colour.

Colour	Binary value
Red	0000
Green	0010
Blue	1000
Purple	0110

The metadata states that the image is 3 pixels wide by 4 pixels high.

The data in the file starts in the top left of the image and goes from left-to-right, top-to-bottom.

(i) State what is meant by **metadata** in an image file.

.....

..... **[1]**

© OCR 2023

(ii) The binary data stored for the image is given:

00000000011010000010100001100110011000000010100 0

A grid is given for the image. Each square is one pixel.

Write the name of the colour in each square that the pixel will show for this image.

[2]

(iii) A colour depth of 4 is used. This means 4 bits are used to store the colour for each pixel.

State the maximum number of different colours that can be represented in 4-bits.

..... **[1]**

(iv) The colour depth is increased to 2 bytes.

State **two** effects that this change can have on the image.

1 .....

.....

2 .....

.....

[2]

(c) A student has a text document and an image file that need to be compressed separately.

The student needs to reduce the file size of both of these files as much as possible.

(i) Identify the most suitable type of compression for the **text** document. Justify your choice.

Type of compression .....

Justification .....

.....

.....

.....

[3]

(ii) Identify the most suitable type of compression for the **image** file. Justify your choice.

Type of compression .....

Justification .....

.....

.....

.....

[3]

© OCR 2023