1. Nov/2021/Paper_11/No.1

Binary is a number system that is used by computers.

(a) Tick (✓) **one** box to show whether binary is a base-2, base-10 or base-16 number system.

Tick (✓)

☐ Base-2

☐ Base-10

☐ Base-16

[1]

(b) Hexadecimal and denary are number systems that can be used by programmers.

Convert these **four** hexadecimal values into denary values.

09 ....

10 ....

28 ....

A1 ....

[4]

Working space

....

....

....

....

....

2.

Georgia is a wedding photographer. She wants to store 10 photographs on a USB flash memory drive for a customer. Each photograph is 100 pixels wide and 50 pixels high.

The photographs are 8-bit colour photographs.

(a) Calculate the total file size, in kilobytes (kB), of all the photographs. For this calculation, you may use the unit of measurement of 1024 or 1000.
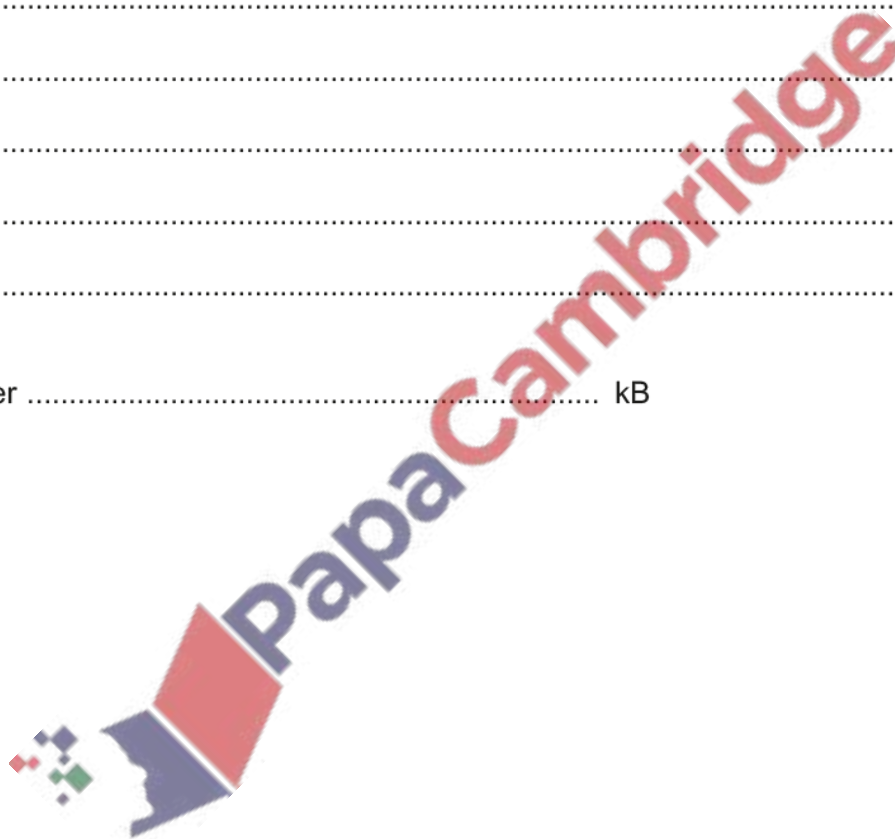
Show all your working.

....

....

....

....

....

....

....

Answer .... kB

[3]

2

(b) Georgia compresses photographs to store them on the USB flash memory drive. It is important that the compression does **not** affect the quality of the photographs in any way.

State which type of compression is the most suitable. Justify your choice.

Compression type ....

Justification ....

....

....

....

[3]

(c) Georgia uses a digital camera. The digital camera takes a photograph that is then converted into a digital image.

Complete the paragraph about the operation of a digital camera, using the most appropriate terms from the list. **Not** all terms in the list need to be used.

- analogue-to-digital
- binary
- charge-coupled
- digital-to-analogue
- lens
- light
- mirror
- pixel
- reflection
- sensor
- storage

When Georgia pushes the button to take a photograph, an aperture opens at the front of

the camera to allow .... to stream in through

the .... This is captured by a sensor called a

.... device. The ....

converter then converts each .... into a digital value.

[5]

3

3.

(a) Denary is a number system that is used by programmers.

Tick (✓) **one** box to show whether denary is a base-2, base-10 or base-16 number system.

Tick (✓)

☐ Base-2

☐ Base-10

☐ Base-16

[1]

(b) Hexadecimal values can be used to represent denary values.

Convert these **four** hexadecimal values into denary values.

05 ....

20 ....

1A ....

AB ....

[4]

Working space

....

....

....

....

....
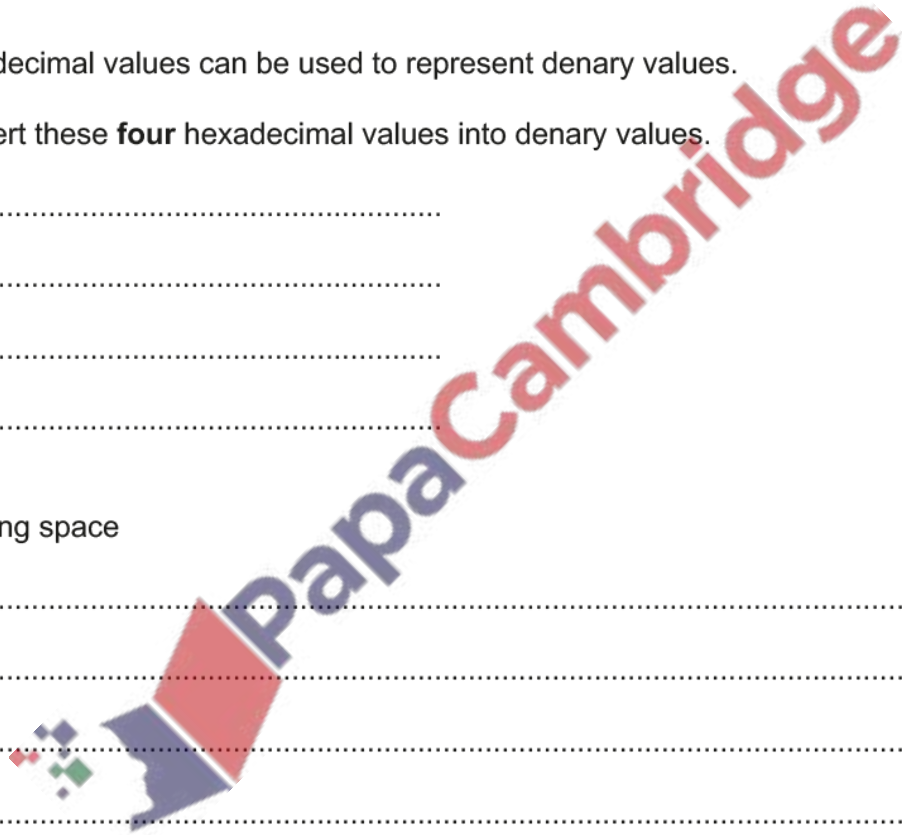
(c) Hexadecimal values can also be converted to binary values.

Tick (✓) **one** box to show the correct 8-bit binary value for each hexadecimal value.

(i) Hexadecimal value 25

Tick (✓)

☐   00011001

☐   00100101

☐   10100001

[1]

(ii) Hexadecimal value 1B

Tick (✓)

☐   00011011

☐   10110001

☐   00011010

[1]

(d) (i) Give **one** way that hexadecimal is used in website development.

.... [1]

(ii) Give **one** way that hexadecimal is used in low-level programming.

.... [1]

4.

Sammi works for a finance company and has a laptop that he uses for his work. He has confidential data about his customers stored on his laptop.

Sammi does **not** connect the laptop to any networks.

(a) Sammi is concerned about his customers' confidential data being viewed by other people in his office.

One method he uses to prevent others viewing the data is encryption.

Identify **three** other methods Sammi could use to prevent his customers' confidential data being viewed.

1 ....

2 ....

3 ....

[3]

(b) Sammi creates videos for the finance company website that give customers advice about their finances.

He uses lossy compression to reduce the file size of the videos for the website.

(i) Give **three** ways that lossy compression can reduce the file size of the videos.

1 ....

....

2 ....

....

3 ....

....

[3]

(ii) Give **one** drawback of using lossy compression to reduce the file size of the videos.

....

.... [1]

(c) Sammi could have used lossless compression to compress the videos for the website.

(i) Give **one** reason why he would use lossless compression, rather than lossy compression, for the videos.

....

.... [1]

(ii) Give **two** disadvantages of Sammi using lossless compression, rather than lossy compression, for the videos.

Disadvantage 1 ....

....

Disadvantage 2 ....

....
[2]

5.
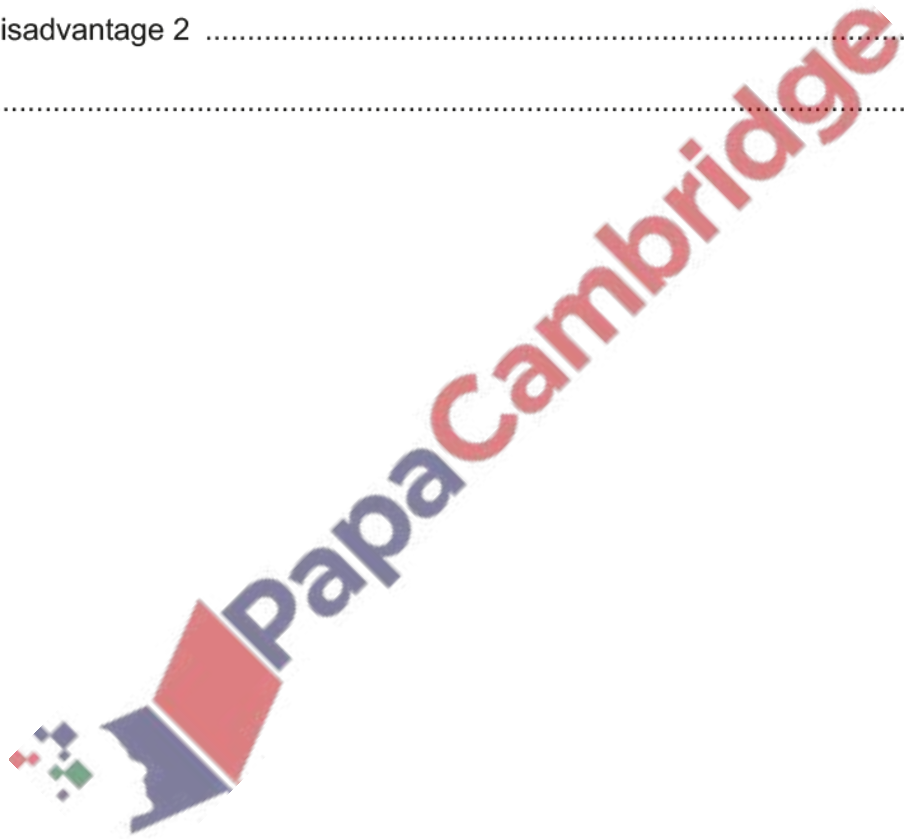
(a) Xia has **three** files stored on her computer.

Tick (✓) **one** box to show which is the largest file size.

File size	Tick (✔)
999 kB	
1 MB	
850 000 bytes	

[1]

(b) Denise has **three** files stored on her computer.

Tick (✓) **one** box to show which is the smallest file size.

File size	Tick (✔)
4000 MB	
2 GB	
2 500 000 kB	

[1]
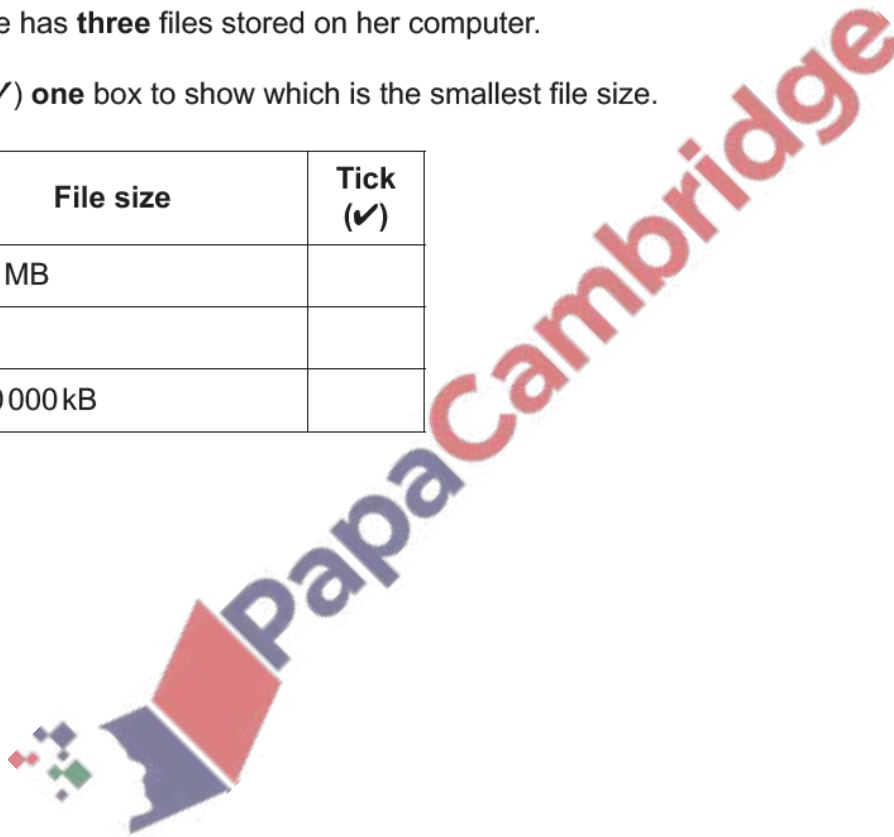
A sports stadium has an electronic counter that counts each person that enters the stadium.

The count is stored as binary in a 16-bit register.

A denary value of the count is displayed on a screen at the entrance.

(a) The screen currently displays:

0	0	7	1

Give the binary value that is stored in the register to display the count shown.

Binary value: ....

Working space

....

....

....

[2]

(b) More people enter the sports stadium and the screen now displays:

0	2	5	7

Give the binary value that is stored in the register to display the count shown.

Binary value: ....

Working space

....

....

....

[2]

(c) After everyone has entered the stadium, the register stores the binary value:

0000001000000100

Show what the screen will display when this binary value is stored.

Display:

[1]

Working space

....

....

....

....

(d) Sensors are used at the entrance to count the number of people entering the stadium.

(i) Identify **two** sensors that could be used to count the number of people entering the stadium.

Sensor 1 ....

Sensor 2 ....

[2]

(ii) Tick (✓) **one** box to show if a sensor is an example of an input device, storage device or output device.

Device	Tick (✔)
input	
storage	
output	

[1]

7.

Julius creates a computer application that calculates how many years it will take to pay for a house.

(a) Julius uploads his application to his website for people to download. Before he uploads the application, he translates the code using a compiler.

Explain why Julius uses a compiler, rather than an interpreter, to do this.

....

....

....

....

....

....

....

.... [4]

(b) Julius also creates videos to explain how to use the application that he has created. He reduces the file size of the videos using lossless compression.

(i) Describe how lossless compression reduces the file size of the video.

....

....

....

....

....

.... [3]

(ii) State why Julius uses lossless compression, rather than lossy compression.

....

.... [1]

8.

Benedict has a computer that is assigned an Internet Protocol (IP) address. The IP address is:

198.167.214.0

The IP address is represented as denary values.

(a) Convert the denary values 167 and 214 from the IP address to 8-bit binary.

167								

214								

Working space

....

....

....

....

[2]

9.

A music company has a website that allows users to stream music. The music is stored in sound files.

(a) The sound files are compressed using lossless compression.

(i) Describe how the sound files are compressed using lossless compression.

....

....

....

....

....

....

....

....

....

....

.... [4]

(ii) State **one** reason why the music company would compress the sound files using lossless, rather than lossy, compression.

....

.... [1]

(iii) Give **one** benefit, to the user, of the music company compressing the sound files.

....

.... [1]

(iv) Give **one** drawback of the music company using lossless, rather than lossy, compression for the sound files.

....

.... [2]

A denary value can be converted into hexadecimal and binary.

(a) Complete the table to show the hexadecimal and 8-bit binary values of the given denary values.

Denary	Hexadecimal	8-bit binary
49		
123		
200		

[6]

Working space

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....

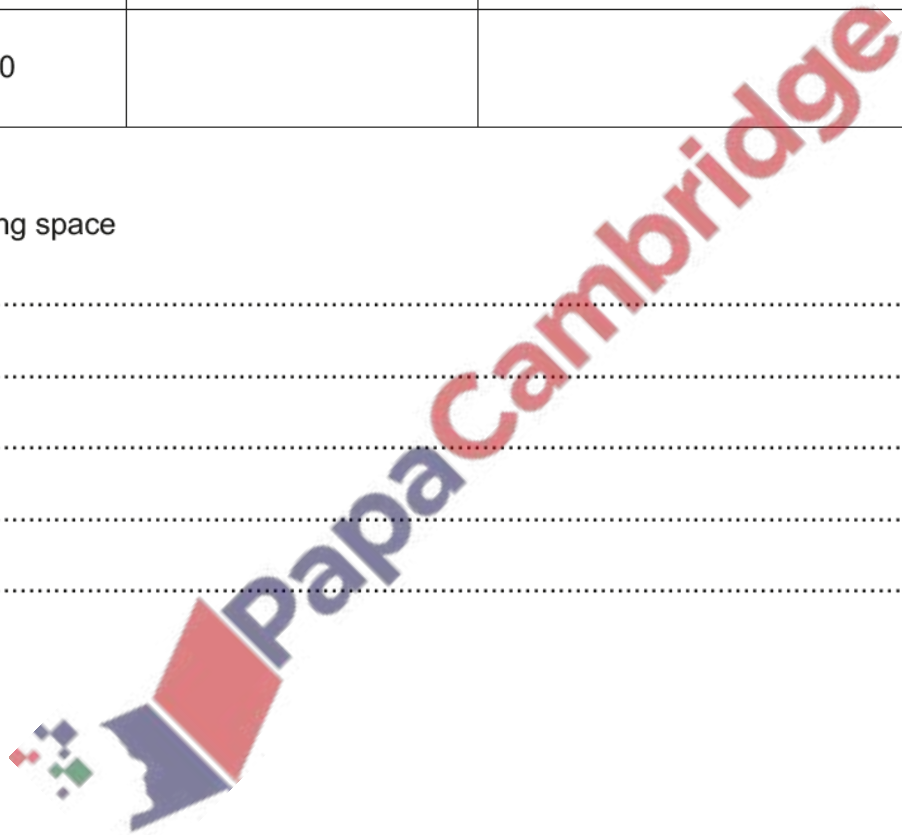..

(b) Give **two** benefits, to users, of converting binary values to hexadecimal.

Benefit 1 ....

....

Benefit 2 ....

....

[2]

(c) Hexadecimal is used to represent Hypertext Markup Language (HTML) colour codes in computer science.

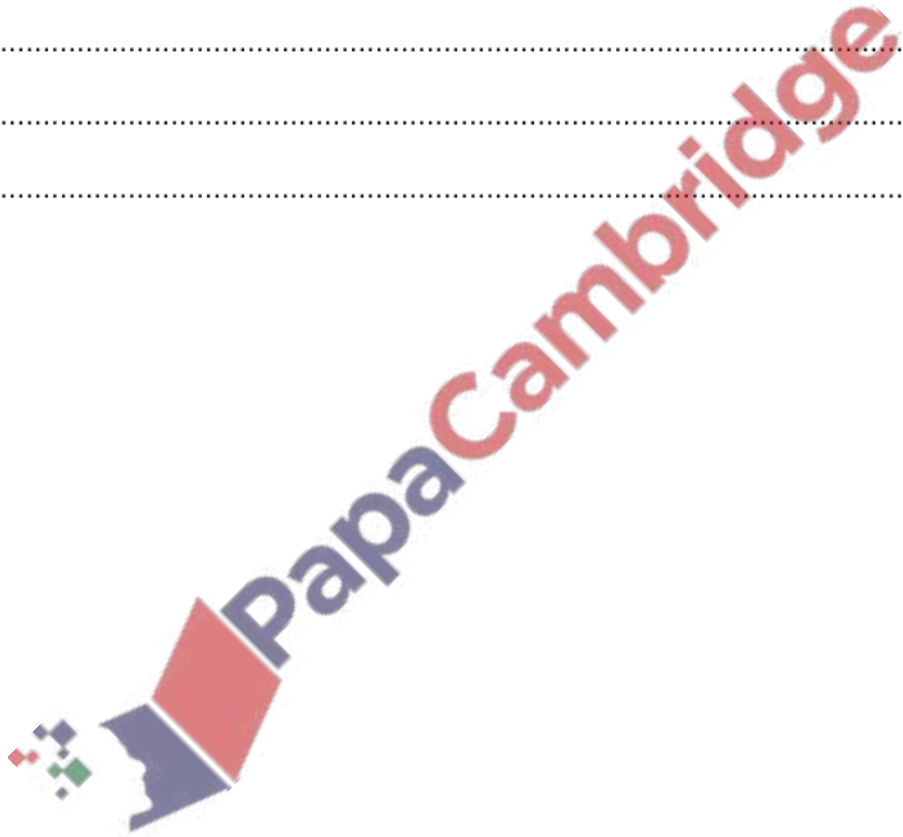Identify **three** other ways that hexadecimal is used in computer science.

1 ....

2 ....

3 ....

[3]

Greta has a computer that she uses for schoolwork and leisure.

(a) The computer has the Media Access Control (MAC) address:

00:A0:C9:14:C8:29

(i) Tick (✓) to show whether the MAC address is initially assigned to the computer by the network, the manufacturer or the user.

Tick (✓)

Network ☐

Manufacturer ☐

User ☐

[1]

(ii) The values in the MAC address are hexadecimal values.

Convert the **three** given hexadecimal values into 8-bit binary.

14 ....

A0 ....

C9 ....

[3]

Working space

....

....

....

(iii) Convert the **two** given hexadecimal values into denary.

29 ....

C8 ....

[2]

Working space

....

....

....

12. Nov/2021/Paper_13/No.2a
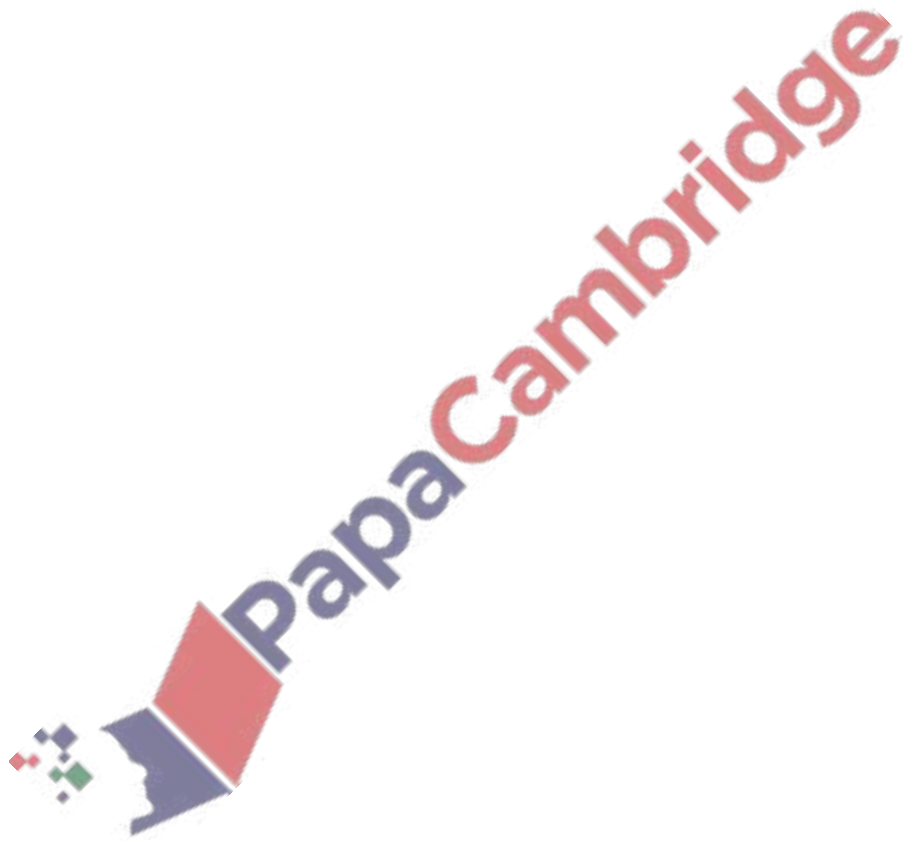
Jolene displays videos on her website. She uses lossy compression to reduce the file size of the videos.

(a) Describe how lossy compression reduces the file size of the videos.

....

....

....

....

....

.... [3]

(b) State **two** reasons why Jolene would use lossy rather than lossless compression for the videos.

Reason 1 ....

....

Reason 2 ....

....

[2]