QUESTION 1.

J

		of students broadcast a school radio station on a website. They record mmes) in advance and email them to the producer.				
(a)	a) Describe how sampling is used to record the sound clips.					
	•••••					
			[3]			
(b)	The	e students use software to compress the sound clips before emailing them.				
	(i)	Circle your chosen method of compression and justify your choice.				
		Lossy / Lossless				
		Justification:				
			[3]			
	Stu	dents also email images to the radio station for use on its website.				
	The	ese are compressed before sending using run-length encoding (RLE).				
	(ii)	Explain what is meant by run-length encoding.				

(iii) The following diagrams show:



- the denary colour code that represents each colour
- the first three rows of a bitmap image

Colour symbol	Colour code (denary)
В	153
W	255

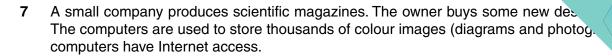
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	В	В	В	В	В	В	В	В	В	В	W	W	W	В	В	В
1	В	В	В	В	В	В	В	В	В	W	W	W	W	W	W	В
2	В	В	В	В	В	В	В	W	W	W	W	W	W	W	W	W
95																

Show how RLE will compress the first three rows of this image.

Row 1:	1:	
Row 2:	2.	
Row 3:	3:	[2]

QUESTION 2.

Ö





(a)	Name three utility programs the company would use on all their computers. Describe each program does.
	1
	Description
	2
	Description
	2
	3
	Description
	[6
(b)	The images contained in the magazines are produced using either bitmap or vector graphics software.
	Give four differences between bitmap and vector graphics.
	1
	2
	3
	4
	[4

(c) Employees using the new computers receive training. At the end of the employee completes a series of questions.



Three answers given by an employee are shown below.

Explain why each answer is incorrect.

(i)	"Encryption prevents hackers breaking into the company's computers."
	[2]
(ii)	"Data validation is used to make sure that data keyed in are the same as the original data supplied."
	[2]
(iii)	"The use of passwords will always prevent unauthorised access to the data stored on the computers."
	[2]

QUESTION 3.

(a) A computer has a microphone and captures a voice recording using sound rec



Before making a recording, the user can select the sampling rate.

		ne the term sampling rate . Explain how the sampling rate will influence the accurdigitised sound.	
	San	npling rate	
	Exp	lanation	
			 [2]
(b)	The	computer also has bitmap software.	
	(i)	Define the terms pixel and screen resolution .	
		Pixel	
		Screen resolution	
			[2]
	(ii)	A picture has been drawn and is saved as a monochrome bitmap image.	
		State how many pixels are stored in one byte.	
	(iii)	A second picture has width 2048 pixels and height 512 pixels. It is saved as a 256-cold	
	()	image.	
		Calculate the file size in kilobytes.	
		Show your working.	
			[3]

(iv)	The actual bitmap file size will be larger than your calculated value.	
	State another data item that the bitmap file stores in addition to the pixel data.	
		[1

QUESTION 4.

U	UE		10N 4.							
3	(a)	A co	A computer has a microphone and captures a voice recording using sound e							
		The	user can select the sampling resolution before making a recording.							
			ne the term sampling resolution . Explain how the sampling resolution will affeuracy of the digitised sound.							
		San	npling resolution							
		Ехр	lanation							
			[3]							
	(b)	The	computer also has bitmap software.							
		(i)	Define the term image resolution.							
			[1]							
		(ii)	A picture is drawn and is saved as a 16-colour bitmap image.							
			State how many bits are used to encode the data for one pixel.							
		(iii)	A second picture has width 8192 pixels and height 256 pixels. It is saved as a 256-colour bitmap.							
			Calculate the file size in kilobytes.							
			Show your working.							
			[3]							
		(iv)	The actual bitmap file size will be larger than your calculated value as a bitmap file has a file header.							
			State two items of data that are stored in the file header.							
			1							

2[2]

QUESTION 5.

1 A company is designing a website.



(a) The company creates a 4-colour bitmap image for the website as shown.

Each colour is represented by a letter, for example, G = grey, K = black.

G	R	G	K	W	R
G	R	G	K	W	R
G	R	G	K	W	R
G	R	G	K	W	R
G	G	G	K	К	R
W	W	W	W	К	R

	(1)	State the minimum number of bits needed to represent each pixel in the image in part (a).
		[1]
	(ii)	Calculate the minimum file size of the image shown in part (a). Show your working.
		Working
		File size
		[⊙]
(b)		company takes a photograph of their office to put on the website. The photograph has solution of 1000 pixels by 1000 pixels. Two bytes per pixel are used to represent the urs.
	(i)	Estimate the file size of the photograph in megabytes. Show your working.
		Working
		Estimated file size[4]

Method

(ii) The file size of the photograph needs to be reduced before it is placed of Draw lines to link each method of reducing the file size of the image to:



Compression type

its description and

Description

• its compression type, where appropriate.

Removes pixels					
	Crop the				
Reduces number of	photograph	Lossy			
pixels per inch	Use run-length	Loosy			
Uses fewer bits per	encoding				
pixel	Use fewer	Lossless			
Ctores salour ands and	colours				
Stores colour code and count of repetitions					
		[5]			
(c) The company has created a logo for	r the website. The logo is a ve	ector graphic.			
	or graphic is a sensible choice for the logo.				
		or the logo.			
Reason 1					
Doggon 0					
Reason 2					

[4]

QUESTION 6.

1 A product designer is creating a poster.



(a) The designer creates a 6-colour bitmap image for the poster as shown.

Each colour is represented by a letter, for example, R = red, B = blue.

R	R	Р	Р	Р	G
В	R	R	Р	G	G
В	W	В	В	0	0
В	W	W	Р	Р	0
В	В	R	Р	G	0
В	R	R	Р	G	0

(i)	State the minimum number of bits needed to represent each pixel in the image in part (a)	-
	[1]
(ii)	Calculate the minimum file size of the image shown in part (a). Show your working.	
	Working	
	File size[3	
(b) (i)	The designer takes a photograph to put on the poster. The photograph has a resolution o 50 000 pixels by 50 000 pixels. The colours are represented using 4 bytes per pixel.	f
	Estimate the file size of the photograph in gigabytes. Show your working.	
	Working	
	Estimated file size	
	[4	1

(ii) The photograph needs to be sent by email but the file size is too big compressed.



[4]

The table lists several methods of making an image file size smaller.

Tick (✓) one box on each row to indicate whether each method is lossy or lossless.

Compression method	Lossy	Lossless
Cropping the image		
Reducing the resolution of the image		
Using run-length encoding (RLE)		
Reducing the colour depth of the image		

(c) Explain how run-length encoding would compress the image in part (a).				
		LO.		

QUESTION 7.

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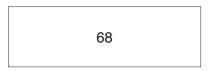
5 Xander creates a presentation that includes images, video and sound.



(a) The images are bitmap images. A bitmap image can be made up of any number Each colour is represented by a unique binary number.

Draw **one** line from **each** box on the left, to the correct box on the right to identify the minimum number of bits needed to store each maximum number of colours.

Maximum number of colours









249

Minimum number of bits

1	



3

	7	

8

(b)	One	e of the videos has a frame rate of 40 fps (frames per second).	
	(i)	State what is meant by 40 fps .	
			. [1]
	(ii)	One video uses interlaced encoding, and a second video uses progressive encoding	3.
		Describe two differences between interlaced and progressive encoding.	
		1	
		2	
			[4]
(c)	The	sound track has a sampling rate of 88.2 kHz and a sampling resolution of 32 bits.	
	Stat	re what is meant by a sampling rate of 88.2 kHz and a sampling resolution of 32 b	its.
	San	npling rate of 88.2kHz	
	San	npling resolution of 32 bits	
			[2]
			14

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