

INFORMATION REPRESENTATION QUESTIONS

1.

Complete the binary addition. Show your working.

[3]



Ac	omputer stores binary data.	
	Tick () one box only to identify the largest file size. 3300 kibibytes 0.3 megabytes 3 mebibytes 3300 kilobytes Subtract the denary number 10 from the denary number 100 using binary subtraction. Show your working.	[1]
	Working	
	Answer	[3]
(c)	Convert the hexadecimal number C0F into denary.	
	Show your working.	
	Working	
	Answer	[2]



3.			
	(a)	Complete the following description.	
		A kibibyte has a prefix. Three kibibytes is the s	ame
		as bytes.	
		A megabyte has a prefix. Two terabytes is the s	ame
		as gigabytes.	[4]
	(b)	Convert the denary number 241 to hexadecimal.	
	(c)	State what is meant by an overflow in binary addition.	



(i)	Complete the table	by	identifying	the	number	of	bits	each	of	the	character	sets	allocat	es
	to each character.													

Character set	Number of bits
ASCII	
extended ASCII	
Unicode	

		[1]
	(ii) Explain how the word 'Clock' is represented by a character set.	
		[2]
A pł	notograph is stored as a bitmap image.	
(a)	The photograph has a resolution of 4000 pixels wide by 3000 pixels high. The bit depth 4 bytes.	h is
	Calculate an estimate for the file size of the photograph in megabytes.	
	Show your working.	
	Working	
	Answer megabytes	
		[2]



(b)	The	photograph is compressed before being uploaded to a web server.	
	(i)	Give three benefits of this photograph being compressed using lossy compressinstead of lossless compression.	ion
		1	
		2	
		3	
			 [3]
	(ii)	Explain how run-length encoding (RLE) will compress the photograph.	
			[2]
(c)	Iden	tify two elements of a bitmap image that can be changed to reduce its file size.	
	1		
	2		
			[2]



(a)	Sta	State one difference between a tebibyte and a gigabyte.								
(b)		Convert the unsigned binary integer into hexadecimal. 110001100111	[1]							
	(ii)	Answer Convert the two's complement binary number into denary. 100110010111	[1]							
		Answer (iii) Convert the Binary Coded Decimal (BCD) into denary. 010101110011	[1]							
	(c)	Answer	[1]							
		Working								
		Answer	[2]							



(d)	State one reason why binary addition and subtraction can result in overflow.
	[1]



The	student compresses the file before it is emailed to their teacher as an attachment.
(i)	Explain the benefits to the teacher of the attachment being a compressed file.
	[3]
(ii)	Describe one lossless method of compressing a text file.
	[3]



(a)	A real-time vi	deo of a music	c concert nee	ds to be stre	eamed to sub	oscribers.		
	Tick (✓) one l	box to identify	the most app	ropriate type	of compres	sion and justif	y your answe	er.
	Lossy	Lossless						
	Justification .							
							[[3]
(b)	Explain the im	pact of chang	jing the sam	oling resolut	ion on the ad	ocuracy of a so	ound record	ing.
								[3]



(c)	A bitmap image has a resolution of 2048 pixels wide and 1024 pixels high.
	The image has a bit depth of 10 bits per pixel.
	Estimate the file size of the bitmap image in mebibytes. Show your working.
	Working
	Estimated file size in mebibytes[2]



A st	student takes a photograph of a science experiment.		
(a)	The	e photograph is saved as a bitmapped image.	
	(i)	Define the following bitmap terms.	
		Colour depth	
		File header	
		[2]	
	(ii)	Explain why changing the image resolution will affect the image quality and file size.	
		Image quality	
		File size	
		[2]	
	(1	iii) Identify one lossless method of compressing an image.	
		[1]	
		The student draws a picture on paper that is scanned into the computer and saved as a vector graphic.	
		Define the vector graphic terms property and drawing list.	
		Property	
		Drawing list	
		[2]	
		[4]	



(a)	A ch	naracter set is used to represent characters in a computer.	
	lder	ntify and describe one character set.	
	Cha	racter set	
	Des	cription	
			[2]
(b)	The	colour of each pixel in a bitmapped image is represented by 8 bits.	
	(i)	State the largest number of different colours that can be represented by 8 bits.	
			[1]
	(ii)	State one drawback of increasing the number of bits that represents each pixel in bitmap image.	the
			[1]
	(iii)	A bitmap image can be compressed using lossy compression.	
		Explain the reasons why lossy compression is often suitable for a bitmap image.	
			[2]



	(c)	(i)	Explain how an analogue sound wave is converted into digital data.
	,	::\	Describe and method of community a count file using least community
	(11)	Describe one method of compressing a sound file using lossy compression.
10.	, ,		[2
	(a)		onvert the hexadecimal number 1FAB into denary.
			enary value[1]
	(b)	Ex	plain how to convert the two's complement integer 10011111 into denary. Give the denary lue after conversion.
		Ex	planation
		De	nary value[3]



	(c)	Describe the difference between	een a right logical binary shift and a right arithmetic binary shift.
			[2]
11.			
	(a)	Draw one line from each veo	ctor graphic term to its most appropriate description.
		Term	Description
		drawing list	a component created using a formula
		drawing object	defines one characteristic of a component
		property	data required to create all components in the graphic

[2]



(b)	State what is meant by the bit depth of a bitmap image and explain how changing the depth affects the image.	bi
	Definition	
	Explanation	
		[3
(c)	Explain why a bitmap image is often compressed before it is attached to an email.	
		[2]



Answer[1]



13.			
	(a)	State what is meant by analogue of	lata.
			[1]
	(b)	Draw one line from each term to its	s most appropriate description.
		Term	Description
		sampling	the number of samples taken per second
		sampling rate	taking measurements at regular intervals and storing the values
		sampling resolution	the number of bits used to store each sample
			[2]



14.		
	(a)	Describe the impact of increasing the image resolution on the quality of a bitmap graphic.
		[2]
	(b)	Calculate the file size of a bitmap image using the following information:
		 image resolution of 2048 pixels wide and 1024 pixels high bit depth of 16 bits.
		Give your answer in kibibytes. Show your working.
		Working
		Answer in kibibytes



Images are being created to advertise holidays.

Some of the images are bitmap images and some are vector graphics.

(a) Complete the table by defining the image terms.

Term	Definition
Drawing list	
Pixel	
Colour depth	

[3]

- (b) The bitmap images are photographs of the holiday locations.
 - (i) Colour depth and image resolution are both included in the file header of a bitmap image.
 Identify two other items that could be included in the file header of each photograph.

1

2

[2]



(ii)	One of the photographs has a bit depth of 8 bytes and an image resolution of 1500 pixels wide and 3000 pixels high.
	Calculate the file size of the photograph in megabytes. Show your working.
	Working
	File sizeMB [2]
(c)	The photographs are compressed before they are uploaded to a web server. Customers download the photographs from this web server.
	(i) Explain the reasons why compressing the photographs will benefit the customers.
	[3]
(ii)	An image can be compressed using run-length encoding (RLE).
	Explain the reasons why RLE may not reduce the file size of a bitmap image. Give one example in your answer.
	[3]



16.	The	computer stores data in binary form.
		State the difference between a kibibyte and a kilobyte.
		[1]
	(ii)	Convert the denary number 964 into Binary Coded Decimal (BCD).
	(iii)	Convert the positive binary integer 11110010 into hexadecimal.
	(111)	
	(iv)	Give the smallest and largest two's complement binary number that can be represented using 8 bits.
		Smallest
		Largest[2]
	(v)	Add the following two binary integers using binary addition. Show your working.
		10110000
		+ 00011011
		[2]
	(vi)	Show the result of a 3-place right logical shift on the binary number: 11001100
		11001100

