

9618/11/M/J/21

1 Anya scans an image into her computer for a school project.

(a) The scanned image is a bitmapped image.

(i) Complete the following table to describe the two terms about graphics.

Term	Description
Pixel
File header

[2]

(ii) The image is scanned with an image resolution of 1024×512 pixels, and a colour depth of 8 bits per pixel.

Calculate an estimate for the file size, giving your answer in mebibytes. Show your working.

Working

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.....

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Answer mebibytes

[3]

(b) The image is compressed using lossless compression.

Identify **one** method of lossless compression that can be used to compress the image **and** describe how the method will reduce the file size.

Lossless compression method

Description

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[3]

(c) One of the colours used in the image has the hexadecimal colour code:

#FC238A

FC is the amount of red, 23 is the amount of green and 8A is the amount of blue in the colour.

(i) Convert the hexadecimal code FC into denary.

..... [1]

(ii) The amount of green in binary is 00100011. This has the denary number 15 added to it to create a second colour.

Add the denary number 15 to the binary number 00100011 and give your answer in binary.

Perform the addition in binary. Show your working.

Working

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Answer (in binary) [3]

(iii) Hexadecimal 23 in two's complement representation is 00100011. The denary number 10 needs to be subtracted from this value.

Subtract the denary number 10 from the two's complement representation 00100011.

Give your answer in binary. Show your working.

Working

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Answer (in binary) [3]

(d) Anya made sure that the image was not subject to any copyright before scanning it.

Describe what is meant by **copyright**.

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..... [2]

9608/11 Jun 18 Q2

2 A logo is designed as a bitmap image.

(a) Describe what is meant by a **bitmap image**.

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..... [2]

(b) A black and white bitmap image is shown.



(i) Explain how a computer can store this bitmap image.

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..... [2]

(ii) The image is compressed before it is attached to an email.

Explain how run-length encoding (RLE) will compress the image.

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 [2]

(c) The finished logo is 500 pixels by 1000 pixels and uses 35 different colours.

Estimate the file size for the logo. Give your answer in kilobytes. Show your working.

Working

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Answer [4]

(d) The logo is redesigned as a vector graphic.

State **two** benefits of a vector graphic compared to a bitmap image. Give a reason for each benefit.

Benefit 1

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Reason 1

.....

Benefit 2

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Reason 2

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[4]

9608/11 Jun 18 8c

(c) X is a register. The current contents of X are:

1	0	0	0	0	1	1	1
---	---	---	---	---	---	---	---

(i) The current contents of register X represent an unsigned binary integer.

Convert the value in X into denary.

.....[1]

(ii) The current contents of register X represent a Binary Coded Decimal.

Convert the value in X into denary.

.....[1]

(iii) The current contents of register X stores a two's complement binary integer.

Convert the value in X into denary.

.....[1]

9608/11 Jun 17 Q3, 4d

3 (a) A computer has a microphone and captures a voice recording using sound recording software.

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

Define the term **sampling rate**. Explain how the sampling rate will influence the accuracy of the digitised sound.

Sampling rate

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Explanation

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[2]

(b) The computer also has bitmap software.

(i) Define the terms **pixel** and **screen resolution**.

Pixel

.....

. Screen resolution

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.....
[2]

- (ii) A picture has been drawn and is saved as a monochrome bitmap image.

State how many pixels are stored in one byte.

.....[1]

- (iii) A second picture has width 2048 pixels and height 512 pixels. It is saved as a 256-colour 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]

9608/11 Jun 17 4d

- (d) Computer scientists often write binary representations in hexadecimal.

- (i) Write the hexadecimal representation for this instruction:

0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

.....[2]

- (ii) A second instruction has been written in hexadecimal as:

05 3F

Write the equivalent assembly language instruction, with the operand in denary.

.....[2]

9608/12 Jun 18 Q4

4 (a) The Accumulator is a register. The current contents of the Accumulator are:

1	1	0	1	1	0	1	1
---	---	---	---	---	---	---	---

The current contents of the Accumulator represent an unsigned binary integer.

- (i) Convert the value in the Accumulator into denary.
.....[1]
- (ii) Convert the value in the Accumulator into hexadecimal.
.....[1]
- (iii) The current contents of the Accumulator represent a two's complement binary integer.
Convert the value in the Accumulator into denary.
.....[1]

(b) The binary integer represents a character from the computer's character set.

- (i) Define the term **character set**.
.....
.....[1]
- (ii) Explain the differences between the **ASCII** and **Unicode** character sets.
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.....
.....[2]

(iii) The ASCII code for 'A' is 41 in hexadecimal.

Calculate the ASCII code in hexadecimal for 'Z'. Show your working.

Working

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ASCII code in hexadecimal for 'Z' [2]

9608/12 Jun 17 Q3

- 3 (a) A computer has a microphone and captures a voice recording using sound editing software.

The user can select the sampling resolution before making a recording.

Define the term **sampling resolution**. Explain how the sampling resolution will affect the accuracy of the digitised sound.

Sampling resolution

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Explanation

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[3]

- (b) The computer also has bitmap software.

- (i) Define the term **image resolution**.

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..... [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.

..... [1]

- (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.

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..... [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]

9608/13 Jun 18 Q3c,

(c) H is a register. The current contents of H are:

1	1	0	0	0	0	0	1
---	---	---	---	---	---	---	---

The current contents of register H represent an unsigned binary integer.

(i) Convert the value in register H into denary.

.....[1]

(ii) Convert the value in register H into hexadecimal.

.....[1]

(iii) The current contents of register H represent a two's complement binary integer.

Convert the value in register H into denary.

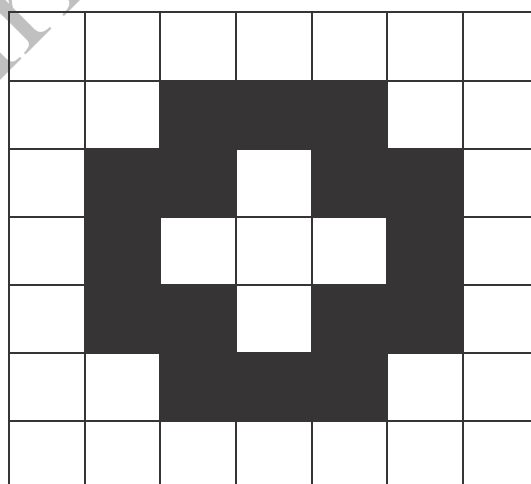
.....[1]

(iv) State why register H does not currently contain a Binary Coded Decimal (BCD).

.....
[1]

9608/13 Jun 18 Q6 a-d

6 A black and white bitmap image is shown.



(a) State the **minimum** number of bits needed to represent each pixel in this image.

.....[1]

(b) Run-length encoding (RLE) is used to store the image with the following colour codes.

Colour	Code
Black	1A
White	3B

Show how run-length encoding is used to store the image.

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.....[3]

(c) An image has 30 different colours.

State the **minimum** number of bits needed to represent each pixel in the 30-colour image.

.....[1]

(d) When the image is saved, a header is added to the file.

State the purpose of the **file header**. Give **two** examples of the file header contents.

Purpose

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Example 1

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Example 2

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[3]