

Question Paper – Image Representation

Jamal runs a photography business. He stores digital photographs on his computer system.

a) The photographs are stored as bitmap images using binary number.

(i) Convert the 8-bit binary number 00001011 to denary

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(1 mark)

(ii) Write down the largest denary number that can be stored using 8-bit binary

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(1 mark)

b) Each image is stored as a bitmap using pixels.

(i) Write a definition of the term pixel

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(1 mark)

An image Jamal is using is sized at 40 pixels by 20 pixels.

(ii) Explain what the 40 pixels represents

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(1 mark)

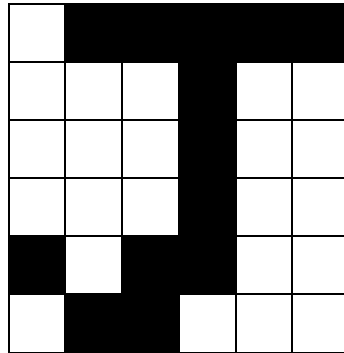
(iii) Calculate the number of pixels used in the image. Show your working.

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(2 marks)

c) The diagram below shows a black and white image that Jamal has stored on his computer.



The image is made up of 36 pixels.

(i) Explain why 36 bits are needed to represent the pixels in the image shown.

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(1 mark)

(ii) How many bits would need to be used to represent the image if it used 256 colours rather than 2?

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(2 marks)

(iii) Write down the bit pattern used to represent the black and white image shown. The first line has been completed for you.

1	0	0	0	0	0

(2 marks)

(iv) Jamal has a black and white image stored on his computer using the following bit pattern. Shade the grid on the right to show the image which is stored.

0	1	1	0
0	0	0	0
1	1	0	1
1	0	1	1

(2 marks)

d) Most of the photographs in Jamal's computer are stored using 24-bit colour depth.

(i) Explain what the term colour depth means

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(1 mark)

(ii) Why do photographs generally use 24-bit colour depth to show colours?

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(2 marks)

One of Jamal's images is 640 pixels x 480 pixels. It uses 24-bit colour depth. The file takes up 6.912 MB of memory.

(iii) Explain how the filesize can be calculated using the width, height and colour depth of the image.

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(2 marks)

The file is almost 7MB in size.

(iv) Convert 7MB to KiloBytes.

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(1 mark)

e) Colours are generally shown to users using hex codes. These use hexadecimal notation.

(i) A pixel in one of Jamal's images is represented by the hex-code #FF0000. What colour does this colour code show?

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(1 mark)

(ii) Give a reason why hex codes are generally used when 24-bit colours are shown to users?

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(1 mark)

(iii) Part of a colour is shown by the hex code 3A. Convert the value represented by this hex code to 8-bit binary.

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(2 marks)

f) Some images are represented using 8-bit colour depth rather than 24-bit colour depth. Discuss the advantages and disadvantages of using 8-bit colour depth.

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(4 marks)