Summative assessment – Answers

## Number bases

Q1. State the number bases for the following types of number:

| **Number system** | **Number base** |
| --- | --- |
| Binary | **2** |
| Decimal | **10** |
| Hexadecimal | **16** |

Q2. Convert 111102 into **decimal**.

| Answer: | **30** |
| --- | --- |

Q3. Convert 111111002 into **hexadecimal**.

| Answer: | **FC** |
| --- | --- |

Q4. Convert A216 into **binary**.

| Answer: | **10100010** |
| --- | --- |

Q5. Convert 25510 into **binary**.

| Answer: | **11111111** |
| --- | --- |

Q6. Convert 4810 into **hexadecimal**.

| Answer: | **30** |
| --- | --- |

## Binary addition

Q1. Perform the binary **addition** for 101010 + 11011.

| Answer: | **1000101** |
| --- | --- |

Q2. Perform the binary **addition** for 1010 + 1111.

| Answer: | **11001** |
| --- | --- |

Q3. Perform the binary **addition** for 111 + 11 + 10000.

| Answer: | **11010** |
| --- | --- |

## Binary subtraction

Q1. Perform the binary **subtraction** for 1110 - 1101.

| Answer: | **1** |
| --- | --- |

Q2. Perform the binary **subtraction** for 1101 - 1011.

| Answer: | **10** |
| --- | --- |

Q3. Perform the binary **subtraction** for 11101 - 1011.

| Answer: | **10010** |
| --- | --- |

## Binary shifting

Q1. What is 10102 × 10002?

| Answer: | **1010000** |
| --- | --- |

Q2. What is 1112 × 100002?

| Answer: | **1110000** |
| --- | --- |

Q3. What is 110112 ÷ 102?

| Answer: | **1101** |
| --- | --- |

Q4. What is 111112 ÷ 1002?

| Answer: | **111** |
| --- | --- |

##

## Sign and magnitude

Q1. Using **8-bit sign and magnitude**, convert 111100112 into decimal.

| Answer: | **-115** |
| --- | --- |

Q2. Using **8-bit sign and magnitude**, convert -6810 into binary.

| Answer: | **11000100** |
| --- | --- |

## Two’s complement

Q1. Using **8-bit two’s complement**, convert 000010002 into decimal.

| Answer: | **+8** |
| --- | --- |

Q2. Using **8-bit two’s complement**, convert 001100002 into decimal.

| Answer: | **+48** |
| --- | --- |

## Bit patterns

## Q1. How many bit patterns can be created with 5 bits?

| Answer: | **32** |
| --- | --- |

Q2. An image requires the use of 68 colours. How many bits are required to represent 68 bit patterns?

| Answer: | **7** |
| --- | --- |

## Representing text

## Q1. A text file that contains 128 characters is created using 8-bit ASCII. How many bytes will the file size be?

| Answer: | **128** |
| --- | --- |

## Q2. A text file that contains 128 characters is created using 16-bit Unicode. How many bytes will the file size be?

| Answer: | **256** |
| --- | --- |

Q3. Complete this ASCII table by entering the binary values for the missing characters.

| **Character** | **Binary value** |
| --- | --- |
| A | 01000001 |
| B | **01000010** |
| C | **01000011** |
| D | **01000100** |

## Representing images

## Q1. If an image has a 3-bit colour depth, how many colours can it have?

| Answer: | **8** |
| --- | --- |

Q2. An image size is 400 × 400 pixels and the image has a resolution of 100ppi. What is the physical size of the image?

| Answer: | **4 inches × 4 inches** |
| --- | --- |

Q3. An image is 16 × 16 pixels and has a colour depth of 2. What is the file size in bytes of this image?

| Answer: | **64 bytes** |
| --- | --- |

Q4. The encoding for this image with a 2-bit colour depth has been started. What is the correct encoding for the third row?

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| Answer: | **00 11 11** |
| --- | --- |

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## Representing sound

## Q1. Which two things have an impact on the quality of a sound representation?

| Answer: | **Sample rate and sample resolution** |
| --- | --- |

Q2. Calculate the file size in bits for a 3-minute sound recording that has used a sample rate of 1,000 hertz and a sample resolution of 2 bits.

| Answer: | **360,000 bits** |
| --- | --- |

Q3. Calculate the file size in bits for a 2-minute sound recording that has used a sample rate of 1,000 hertz and a sample resolution of 4 bits.

| Answer: | **480,000 bits** |
| --- | --- |

## Measurements of storage

## Q1. How many megabytes are in a gigabyte?

| Answer: | **1,000** |
| --- | --- |

## Q2. How many gigabytes are in a terabyte?

| Answer: | **1,000** |
| --- | --- |

Q3. Place these measurements of storage in order from smallest to largest.

| A | 14 bits |
| --- | --- |
| B | 1 megabyte |
| C | 2 bytes |
| D | 3 nibbles |

Write the letters for each measurement in order below:

| Answer: | **D, A, C, B** |
| --- | --- |

## Lossy and lossless compression

## Q1. True or false? When a lossy compression algorithm is applied, it is impossible to decompress the file back into its original state.

| Answer: | **True** |
| --- | --- |

## Q2. True or false? JPEG is a form of lossless compression.

| Answer: | **False** |
| --- | --- |

## Q3. True or false? MP3 is a form of lossless compression.

| Answer: | **False** |
| --- | --- |

## Run length encoding

## Q1. Below is the encoding for a bitmap image. Use run length encoding to compress the image. Use **decimal** values for the numbers of occurrences.

11 11 00 00 00 00 11 11

| Answer: | **2 11 4 00 2 11** |
| --- | --- |

## Q2. Below is the encoding for a bitmap image. Use run length encoding to compress the image. Use **binary** values for the numbers of occurrences.

11 11 11 00 00 00 00 11 11

| Answer: | **0110 11 1000 00 0010 11** |
| --- | --- |

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## Huffman coding

## Q1. Is Huffman coding lossy or lossless compression?

| Answer: | **Lossless** |
| --- | --- |

Q2. This is a Huffman tree that has been created for the word GEMINI. Complete the table below to state the bit pattern that would be used for each character in this word.



| Character | Bit pattern |
| --- | --- |
| I | **0** |
| M | **100** |
| E | **101** |
| G | **110** |
| N | **111** |

Q3. Write down the full bit pattern for the compressed word GEMINI. Use the table above to help you with this.

| **110 101 100 0 111 0** |
| --- |

Q4. What is the file size of the original file containing the word GEMINI in bits if 8-bit ASCII is used?

| **48 bits** |
| --- |

Q5. What is the file size of the compressed file containing the word GEMINI in bits?

| **14 bits** |
| --- |

Q6. How many **extra** bits are required for the uncompressed file?

| **34 bits** |
| --- |

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