SMART EXAM RESOURCES
0478 IGCSE COMPUTER SCIENCE
PAPER-1
NUMBER SYSTEMS
QP-MS

1 A user enters data that is hexadecimal into a computer system. The data is converted to binary to be processed by the computer.

(a) (i) Give **one** similarity between hexadecimal and binary.

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..... [1]

(ii) Give **two** differences between hexadecimal and binary.

1 .....

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2 .....

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[2]

(b) Data that is denary can also be converted to binary.

Give the binary number for each of the **three** denary numbers.

15 .....

180 .....

235 .....
[3]

Working space

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(c) Denary numbers can also be converted to hexadecimal.

Give the hexadecimal number for each of the **three** denary numbers.

14 .....

100 .....

250 .....

[3]

Working space

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(d) A binary integer that is stored in a register in the computer has a logical left shift performed on it.

(i) Describe the process of the logical left shift that is performed on the binary integer.

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..... [2]

(ii) State what effect this will have on the binary integer.

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..... [1]

(e) A negative binary integer needs to be stored in a register in the computer.

Give the name of the number system that can be used to represent negative binary integers.

..... [1]

MARKING SCHEME

(a)(i)	They are both **number systems**	**1**
(a)(ii)	• Binary is base-2 whereas hexadecimal is base-16 • Binary only uses numbers whereas hexadecimal also uses letters // Binary only uses 0 and 1 whereas hexadecimal uses 0 to 9/A to F	**2**
(b)	• (0000)1111 • 10110100 • 11101011	**3**
(c)	• E • 64 • FA	**3**
(d)(i)	Any **two** from: • **Each/All/Every value/digit/bit** in the binary number is **shifted/moved** to the **left** • The **left most/most significant** bit is lost • A **0** is added as the **right most/least significant** bit	**2**
(d)(ii)	The binary integer is multiplied by 2	**1**
(e)	Two's complement	**1**

2 Data can be measured using different units of storage.

(a) Tick (✓) **one** box to show which of the following is the largest unit of data storage.

A tebibyte (TiB) ☐

B pebibyte (PiB) ☐

C mebibyte (MiB) ☐

D gibibyte (GiB) ☐

[1]

(b) A computer has primary storage.

Give **one** example of primary storage.

Explain the purpose of your chosen example.

Example .....

Explanation .....

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[3]

(c) All data is converted to binary to be processed by a computer.

(i) Calculate the binary number for the denary number 175. Show all your working.

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..... [2]

(ii) Give the binary number for the given hexadecimal numbers.

15 .....

2D .....

091 .....

[3]

Working space

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(d) Binary integers can be added together.

Add the **two** binary integers using binary addition. Show all your working. Give your answer in binary.

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  1 1 1 0 0 0 1 1
+ 1 1 0 0 1 1 0 0
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[4]

(e) Calculate the denary number for the two's complement binary integer 10001110. Show all your working.

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..... [2]

MARKING SCHEME

(a)	B	1
(b)	One mark for correct example. Two marks for matching explanation. • **RAM** • To **store** data/instruction that is **currently in use** • To **store** software/programs that are **currently in use** • For volatile storage // to store data **temporarily** • To allow data to be **accessed** directly **by the CPU/processor** // To allow data to be **stored closer** to the CPU/processor • **ROM** • To **store** the BIOS • To **store** the bootstrap/bootloader • To **store** start-up instructions • To **store** the firmware • For non-volatile storage // to store data **permanently** • To **store data/instructions** that **should not change** (unless needed) • **Cache** • To **store frequently** used instructions/data • For volatile storage // to store data **temporarily**	3
(c)(i)	One mark for valid working, for example: 128 + 32 + 8 + 4 + 2 + 1 One mark for correct answer: 10101111	2
(c)(ii)	• 0001 0101 • 0010 1101 • 0000 1001 0001	3
(d)	One mark for each correct nibble. One mark for method of working, for example: carries. One mark for identification of overflow. 1 1 1 1 0 0 0 1 1 + 1 1 0 0 1 1 0 0 1 1 0 1 0 1 1 1 1	4
(e)	One mark for correct working, for example: flip and add One mark for correct denary. –114	2

3 Hypertext markup language (HTML) colour codes can be represented as hexadecimal.

(b) Denary numbers can be converted to hexadecimal.

Convert the **three** denary numbers to hexadecimal.

20 .....

32 .....

165 .....

[3]

Working space

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MARKING SCHEME

	14 20 A5	3

4 Data can be measured in bits.

(a) Give the name of the data storage measurement that is equal to 8 bits.

..... [1]

(b) State how many bits there are in a kibibyte (KiB).

..... [1]

(c) Give the name of the data storage measurement that is equal to 1024 gibibytes (GiB).

..... [1]

(d) A 16-bit colour image has a resolution of 512 pixels wide by 512 pixels high.

Calculate the file size of the image in kibibytes (KiB). Show all your working.

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Answer ..... KiB

[3]

MARKING SCHEME

(a)	(1) byte	**1**
(b)	8192	**1**
(c)	(1) Tebibyte // TiB	**1**
(d)	**One** mark for each correct stage of working (**max** 2): • 512 × 512 • 262 144 * 2 // multiplied by 16 and divided by 8 • 524 288/1024 **One** mark for the correct answer: 512 (KiB)	**3**

5 Binary is a base 2 number system.

(a) Give the name of the number system that is base 16.

..... [1]

(b) **Three** denary numbers are entered into a computer. The computer converts the numbers and stores them as binary.

(i) Give the binary number that would be stored for each of the denary numbers.

10 .....

50 .....

201 .....

[3]

Working space

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(ii) Explain why the data is converted to binary by the computer.

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..... [2]

(c) The two binary integers 00110000 and 01100110 are added together.

Add the binary integers using binary addition and show your answer in binary. Show all your working.

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..... [3]

(d) The denary integer –32 is stored as a two's complement integer.

Calculate the two's complement integer that would be stored.

Show all your working.

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..... [2]

MARKING SCHEME

(a)	Hexadecimal	**1**
(b)(i)	1010 110010 11001001	**3**
(b)(ii)	**Two** from: • Computers use **logic gates/switches** … • … that only process the values 1 and 0 // that only have two states	**2**
(c)	**One** mark for evidence of working, for example 2 carries **One** mark for each correct nibble (Max 2) 1 1 0 0 1 1 0 0 0 0 0 1 1 0 0 1 1 0 1 0 0 1 0 1 1 0	**3**
(d)	**One** marking for evidence of working For example, flip and add **One** mark for correct binary 11100000	**2**