

Topic: 1.1.2 Hexadecimal

- Express the denary value 109 as a hexadecimal number.
- Express the denary number 78 as a hexadecimal number,
- Convert the following Hexadecimal numbers into denary system and binary system:
 - A1
 - 37
 - FF
 - 0D
 - ABC

May/June 2015 P11 (2210)

9 Draw a line to connect each question to the correct answer.

Question	Answer
What is the denary (base 10) equivalent to the hexadecimal digit E ?	8
If $1 \text{ GB} = 2^x$ then what is the value of X ?	12
How many bits are there in one byte?	14
If the broadband data download rate is 40 megabits per second, how many seconds will it take to download a 60 MB file?	19
What is the denary (base 10) value of the binary number 0 0 1 0 0 1 0 0 ?	30
What hexadecimal value is obtained when the two hexadecimal digits C and D are added together?	36



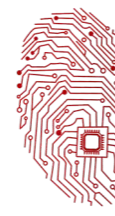
[5]





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10

(b) An encryption system works by shifting the binary value for a letter one place to the left. "A" then becomes:

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

This binary value is then converted to hexadecimal; the hexadecimal value for "A" will be:

C 2

For the two letters "L" and "G", shift the binary values one place to the left and convert these values into hexadecimal:

hexadecimal

L:							
G:							

[4]

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4 (a) (i) Convert the following **two** hexadecimal numbers into binary:

F A 7
D 3 E

FA7											
D3E											

[4]

(ii) Now perform the AND (logic) operation on each corresponding pair of binary bits in the two numbers from **part (i)**.

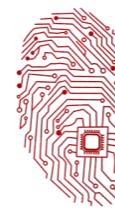
--	--	--	--	--	--	--	--	--	--	--	--

[2]

(iii) Convert your answer in **part (ii)** into hexadecimal.

[2]





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(b) (i) The following code shows HTML 'tag' pairs on either side of the text stating the colour that each creates.

```
<font color " # F F 0 0 0 0 " > RED </font>  
<font color " # 0 0 F F 0 0 " > GREEN </font>  
<font color " # 0 0 0 0 F F " > BLUE </font>  
<font color " #           X           " > YELLOW </font>  
<font color " #           Y           " > MAGENTA </font>  
<font color " #           Z           " > CYAN </font>
```

Yellow is a combination of red and green, magenta a combination of red and blue and cyan a combination of green and blue.

State what 6-digit hexadecimal values should replace X, Y and Z in the above code.

[3]

(ii) Describe how other colours, such as a darker shade of blue, are created.

[2]

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3 (a) Convert the following hexadecimal number into 12-bit binary:

4 A F

--	--	--	--	--	--	--	--	--	--	--	--

[3]

(b) The 2016 Olympic Games will be held in Rio de Janeiro. A timer that counts down to the opening of the Games is shown on a microprocessor-controlled display. The number of hours, minutes and seconds until the Games open are held in three 8-bit registers.

The present register values are:

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

 105 hours

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

 32 minutes

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

 20 seconds

The timer will count **down** in seconds.

(i) Show the values in each 8-bit register **30 seconds** after the time shown above:

--	--	--	--	--	--	--	--

 hours

--	--	--	--	--	--	--	--

 minutes

--	--	--	--	--	--	--	--

 seconds

[3]





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(ii) Write the hexadecimal value of the **minutes** register from **part (b)(i)**.

[1]

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11 A security system is installed in a house. A hexadecimal number is entered to activate or deactivate the alarm.

(a) The alarm code is set to hexadecimal number **2 A F**

Show how this number would be stored in a 12-bit binary register.

--	--	--	--	--	--	--	--	--	--	--	--

[3]

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10 (a) A manufacturer of aeroplane engines assigns a denary identification number (ID) to each engine.

One engine has the ID: 0431

(ii) Show how this number would be represented in hexadecimal.

[3]

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1 The memory of a computer contains data and instructions in binary. The following instruction is stored in a location of the memory.

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

(a) Convert the instruction into hexadecimal.

[2]

(b) Explain why a programmer might prefer to read the instruction in hexadecimal rather than in binary.

[2]

(c) Give **two** other uses of hexadecimal.

[2]

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1 A robot arm in a factory is programmed to move products. The binary instructions to operate the robot arm are:

Operation	Binary Instruction				
UP	<table border="1" style="display: inline-table; text-align: center;"> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table>	1	1	1	1
1	1	1	1		
DOWN	<table border="1" style="display: inline-table; text-align: center;"> <tr><td>0</td><td>0</td><td>0</td><td>1</td></tr> </table>	0	0	0	1
0	0	0	1		
LEFT	<table border="1" style="display: inline-table; text-align: center;"> <tr><td>1</td><td>0</td><td>0</td><td>1</td></tr> </table>	1	0	0	1
1	0	0	1		
RIGHT	<table border="1" style="display: inline-table; text-align: center;"> <tr><td>0</td><td>1</td><td>1</td><td>0</td></tr> </table>	0	1	1	0
0	1	1	0		
OPEN	<table border="1" style="display: inline-table; text-align: center;"> <tr><td>1</td><td>1</td><td>0</td><td>0</td></tr> </table>	1	1	0	0
1	1	0	0		
CLOSE	<table border="1" style="display: inline-table; text-align: center;"> <tr><td>0</td><td>0</td><td>1</td><td>1</td></tr> </table>	0	0	1	1
0	0	1	1		





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The instructions are entered as hexadecimal values.

An operator enters the values:

9 1 C 3 F

Convert the values and write down the operation (e.g. RIGHT) carried out by the robot arm.

9

1

C

3

F

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[5]

1 (b) The display screen shows a hexadecimal error code:

E04

This error code means that the water will not empty out of the washing machine.

Convert this error code to binary.

--	--	--	--	--	--	--	--	--	--	--	--

[3]

(c) State why hexadecimal is used to display the error code.

[1]

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2 Dheeraj identifies **three** hexadecimal numbers.

Write the **denary** number for each of the three hexadecimal numbers:

2A

101

21E

[3]

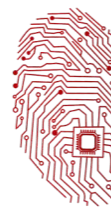
10 RockICT is a music business that has a website to allow customers to view and buy the products it sells.

The website consists of web pages.

(a) Describe what is meant by HTML structure and presentation for a web page.

[4]





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4 Jafar is using the Internet when he gets the message:

“D03, page is not available”

Jafar remembers that hexadecimal is often used to represent binary values in error codes. Convert the hexadecimal number in the error message into 12-bit binary.

--	--	--	--	--	--	--	--	--	--	--	--

