**0 1 . 1** Convert the **hexadecimal** numbers 27 and C9 into **binary**. Then, in **binary**, add them together to work out the total. Finally, convert the total back into **hexadecimal** to give the answer.

You **must** show your working.

**[2 marks]**

Answer in hexadecimal 

**0 1 . 2** In **decimal**, what is the most negative number that can be represented using a **12-bit two's complement binary integer**?

**[1 mark]**

**0 2 . 1** The bit pattern below represents an **unsigned fixed-point binary** number with five bits before and five bits after the binary point.

Convert the binary number into decimal.

| 1 | 0 | 0 | 1 | 1 ● | 1 | 0 | 0 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|

**[2 marks]**

**0 2 . 2** Explain how the **two's complement binary integer** 00100111 can be subtracted from the **two's complement binary integer** 01001001 without converting the numbers into decimal.

**[2 marks]**

**0 3 . 1**  **Figure 2** shows two unsigned binary integers.

**Figure 2**

| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
|---|---|---|---|---|---|---|---|

| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
|---|---|---|---|---|---|---|---|

What is the result **in binary** of multiplying the two numbers shown in **Figure 2**?

You **must** show all your working in binary.

**[2 marks]**

Answer

**0 3 . 2**    Convert the decimal number 6.34375 into an **unsigned fixed point binary number** using 8 bits with 5 bits after the binary point.

You may use the space below for working.

**[2 marks]**

Answer

**0 4 . 1** Convert the decimal number 177 to unsigned binary using 8 bits.

**[1 mark]**

**0 5 . 1** State, **in decimal**, the lowest and highest values that could be represented in unsigned binary when using 16 bits.

**[2 marks]**

Lowest

Highest

**0 5 . 2** **Figure 1** and **Figure 2** show the bit patterns of two **unsigned binary integers**.

**Figure 1**

| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
|---|---|---|---|---|---|---|---|

**Figure 2**

| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|

Calculate the result of multiplying these two numbers together using **binary multiplication**.

You **must** show your working in binary.

**[2 marks]**

Answer

**0 6 . 1** Shade in **one** lozenge to indicate which of the following prefixes represents $10^6$

**[1 mark]**

**A** kibi ⬭

**B** mebi ⬭

**C** gibi ⬭

**D** kilo ⬭

**E** mega ⬭

**F** giga ⬭

**0 6 . 2**    **Table 1** shows two unsigned binary integers, **Number 1** and **Number 2**.

Complete the table to show the result in binary of adding the two numbers.

You **must** complete the carry row to show the carry from the previous column where there is one.

**Table 1**

| Number 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|
| Number 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| Result | | | | | | | | |
| Carry | | | | | | | | |

**[1 mark]**

**0 6 . 3**    What is the result of subtracting the two's complement binary number `00100100` from the two's complement binary number `00011011`?

You should give your answer in two's complement binary.

You **must** show all your working in binary.

**[2 marks]**

**0 6 . 4**    In **decimal**, what are the lowest and highest values that can be represented by an **8-bit two's complement** binary integer?

**[1 mark]**

Lowest: _____      Highest: _____

**0 6 . 5** What is the **decimal** equivalent of the bit pattern shown in **Figure 1** if it represents an **unsigned fixed-point binary** value with two bits before the binary point and six bits after the binary point?

**Figure 1**

| 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
|---|---|---|---|---|---|---|---|

**[2 marks]**

**0 7 . 1** Convert the bit pattern `10001010` to hexadecimal.

**[1 mark]**

**0 7 . 2** Represent the decimal number 139 as an **8-bit unsigned binary integer**.

**[1 mark]**

**0 7 . 3** Show how the **unsigned binary number** `00100011` can be added to the **unsigned binary number** `00101011` without converting the numbers into decimal.

You **must** show all your working in binary.

**[2 marks]**

```
  0 0 1 0 0 0 1 1
+ 0 0 1 0 1 0 1 1
```

_____

_____

**0 7 . 4** Show how the **8-bit two's complement binary integer** `00011100` can be subtracted from the **8-bit two's complement binary integer** `00111011` without converting the numbers to decimal.

You **must** show all your working in binary.

**[2 marks]**

**0 7 . 5** The bit pattern in **Figure 1** represents a **10-bit unsigned fixed point binary number** with four bits before and six bits after the binary point.

**Figure 1**

| 0 | 1 | 1 | 1 ● 0 | 1 | 0 | 1 | 1 | 0 |
|---|---|---|-------|---|---|---|---|---|

Convert the bit pattern in **Figure 1** to decimal.

**[2 marks]**