1 A student has an electronic calculator. The calculator has a screen that displays the result of calculations.

The calculator has 8-bit registers.

(a) State the highest denary number that could be stored in a single 8-bit register.

..... [1]

(b) Denary numbers are typed into the calculator. They are converted to binary numbers and stored in the 8-bit registers.

The student types in the denary number 23 and the denary number 168.

Give the 8-bit binary numbers that are stored in the registers for these **two** denary numbers.

23								
168								

[2]

Working space .....

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.....

(c) The result of a calculation that is stored in a register is the binary number 00001011

Give the denary number that will be displayed on the screen for this binary number.

00001011 ..... [1]

Working space

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(d) Another result of a calculation that is stored in a register is the binary number 01000010

Give the denary number that will be displayed on the screen for this binary number.

01000010 ..... [1]

Working space

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(e) Two binary numbers stored in the registers are 01110110 and 00110000

Add the binary numbers using binary addition. Show all your working.

Give your answer in binary.

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

[3]

(f) The result of a calculation could be a negative denary number.

State how the calculator could represent a negative denary number as a binary number.

..... [1]

(g) The electronic calculator is an example of an embedded system.

Explain why it is an example of an embedded system.

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..... [2]