DAH Quiz.

1. range: 40 MeV -> 2.0 TeV

=> $2.0 \times 10^{12} \div 40 \times 10^{6} = 50{,}000$

40×10^{6} goes 5×10^{4} times into 2.0×10^{12} ∴ if 40×10^{6} was 1 bit it would take $\log_2(5 \times 10^{4})$ bits to cover the range.

$\log_2(5 \times 10^{4}) = 15.609$

round up to next integer => 16

It would take 16 bits.

2. PCF8574AN expander I/O chip.

0x38 => (0,0,0)

If (0,0,0)=0, (1,1,1) would have a value of 7. (difference of 8)

$(38)_{16} = (56)_{10}$ $56 + 8 = (63)_{10} = (3F)_{16}$

[The slave address would be 0x3F]

Hexadecimal numbers work in base 16 and introduce letters to represent numbers in base 10.

base 10 Decimal	base 16 Hexadecimal
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F
16	10
⋮	⋮

A PCF8574AN chip requires 2 of the raspberry pi's GPIO I²C pins. The raspberry pi supports 7 bit addresses which leads to 128 (2^7) unique addresses. This allows for a raspberry pi to control 128 PCF8574AN chips.