1 (a) Prove that

$$(2m + 1)^2 - (2n - 1)^2 = 4(m + n)(m - n + 1)$$

(3)

Sophia says that the result in part (a) shows that the difference of the squares of any two odd numbers must be a multiple of 4

(b) Is Sophia correct?
You must give reasons for your answer.

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.....

(1)

(Total for Question 1 is 4 marks)

2 (a) Factorise $a^2 - b^2$

.....

(1)

(b) Show that $2^{40} - 1$ is the product of two consecutive odd numbers.

(2)

(Total for Question 2 is 3 marks)

3 There are only red counters and yellow counters in bag **A**.

number of red counters : number of yellow counters = 3 : 5

There are only green counters and blue counters in bag **B**.
The number of counters in bag **B** is half the number of counters in bag **A**.

Given that there are x red counters in bag **A**,

use algebra to show that the total number of counters in bag **A** and bag **B** is $4x$

(Total for Question 3 is 3 marks)