1. An arithmetic sequence has first term a and common difference d, $d \neq 0$.
The 3rd, 4th and 7th terms of the arithmetic sequence are the first three terms of a geometric sequence.

(a) Show that $a = -\frac{3}{2}d$.

(3)

(b) Show that the 4th term of the geometric sequence is the 16th term of the arithmetic sequence.

(5)
(Total 8 marks)

2. Find the sum of all three-digit natural numbers that are not exactly divisible by 3.

(Total 5 marks)

3. An 81 metre rope is cut into n pieces of increasing lengths that form an arithmetic sequence with a common difference of d metres. Given that the lengths of the shortest and longest pieces are 1.5 metres and 7.5 metres respectively, find the values of n and d.

(Total 4 marks)