

**FORMATIVE QUIZ**

name: \_\_\_\_\_ score: \_\_\_\_/31

1. (a) The sum of the first six terms of an arithmetic series is 81. The sum of its first eleven terms is 231. Find the first term and the common difference.

**(6)**

- (b) The sum of the first two terms of a geometric series is 1 and the sum of its first four terms is 5. If all of its terms are positive, find the first term and the common ratio.

**(5)**

- (c) The  $r^{\text{th}}$  term of a new series is defined as the product of the  $r^{\text{th}}$  term of the arithmetic series and the  $r^{\text{th}}$  term of the geometric series above. Show that the  $r^{\text{th}}$  term of this new series is  $(r + 1)2^{r-1}$ .

**(3)**

- (d) Using mathematical induction, prove that

$$\sum_{r=1}^n (r+1)2^{r-1} = n2^n, n \in \mathbb{Z}^+.$$

**(7)****(Total 21 marks)**

2. (a) Find the sum of the infinite geometric sequence  $27, -9, 3, -1, \dots$ .

(3)

- (b) Use mathematical induction to prove that for  $n \in \mathbb{Z}^+$ ,

$$a + ar + ar^2 + \dots + ar^{n-1} = \frac{a(1-r^n)}{1-r}.$$

(7)

(Total 10 marks)